DOCUMENT RESUME

ED 369 890 CE 066 217

AUTHOR Birkenholz, Robert H.; And Others
TITLE Pilot Study of Agricultural Literacy. Final Report.
INSTITUTION Missouri Univ., Columbia. Dept. of Agricultural Education.
SPONS AGENCY Department of Agriculture, Washington, D.C.
PUB DATE Dec 93
CONTRACT 91-COOP-1-6720
NOTE 102p.
PUB TYPE Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS *Agricultural Education; *Agriculture; Attitude Measures; Attitudes; Blacks; *Educational Needs; Elementary Secondary Education; *Food; *Knowledge Level; Literacy; *Natural Resources; Pilot Projects; Questionnaires; Rural Areas; Tables (Data); Urban Areas; Whites
IDENTIFIERS *Agricultural Literacy

ABSTRACT

A study assessed the knowledge and perceptions of U.S. citizens regarding agriculture, food, and natural resources. Data were collected from 2,005 respondents representing the following groups: purposely selected primarily white Indiana high school students and primarily black Michigan high school students, randomly selected rural Missouri adults attending one of several town meetings, and randomly selected urban Missouri adults contacted in various settings (including churches, libraries, and grocery stores). Adults were more knowledgeable about agriculture than were high school students. Respondents were most knowledgeable and positive about natural resources and least knowledgeable and positive about agricultural policy. No differences among ethnic groups' perceptions of agriculture or between rural and urban Missouri adults' knowledge of agricultural concepts were discovered. The study recommendations included the following: integrating agricultural instruction throughout elementary and secondary school curricula, developing agricultural literacy instructional efforts targeting inner city minority students, broadcasting television agricultural literacy programs for adults in urban areas, and establishing a National Center for Agricultural Literacy to coordinate agricultural literacy efforts at a national level. (Appended are knowledge statement responses by group, 12 data charts, and the survey instrument. Contains 12 references and 20 tables. (MN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 369 890

FINAL REPORT

by

Principal Investigator:
Robert J. Birkenholz, Associate Professor
Agricultural Education, University of Missouri

Co-Investigators:
Martin J. Frick, Purdue University
Harrison Gardner, Michigan State University
Leon G. Schumacher, University of Missouri
Donald R. Wallace, Lincoln University

December 1993

CE066 217

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

R Birkenholz

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

This material is based upon work supported by the U.S. Department of Agriculture, Cooperative State Research Service under Agreement No. 91-COOP-1-6720.

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture.

ACKNOWLEDGEMENTS

Conducting a project of this magnitude required the cooperation of numerous individuals and groups. Don Case, Marty Frick, Harry Gardner, Leon Schumacher, and Don Wallace made immeasurable contributions, enhancing the scope and quality of this research effort. Without their cooperation and assistance this project would not have been possible.

Appreciation is also extended to the USDA Cooperative State Research Service (CSRS), most notably Agency Administrator John Patrick Jordan, for providing funding to support project activities. Support for this research represented a relatively new thrust for the USDA in social science research in agriculture.

Clark Harris, Jennifer Lichte, and Amy Lorance should be recognized for their contributions to the success of this project while serving as Graduate Research Assistants. Special appreciation is also extended to Sherri Griffy, who provided secretarial assistance throughout the project, and to Sandy Kaiser, who assisted in the preparation of the final report for publication. Thank you for all your help.

Also, the unnamed individuals who provided responses to the survey questionnaire used in this study should be acknowledged. This study depended upon their input.

Many other individuals contributed in various ways to the success of this research project. However, in the space available only a relative few could be identified by name. Sincere appreciation is extended to all who contributed to this effort. Thank You!

Bob Birkenholz
Principal Investigator
University of Missouri

PILOT STUDY OF AGRICULTURAL LITERACY
EXECUTIVE SUMMARY

This study was conducted to assess the knowledge and perceptions of U.S. citizens regarding agriculture, food, and natural resources. Four groups of respondents provided data representing primarily white Indiana High School students, primarily black Michigan High School students, Rural Missouri Adults, and Urban Missouri Adults. Data were collected from 2,005 respondents but did not constitute a representative sample of all U.S. citizens. Therefore, the findings, conclusions, and recommendations reported in this study cannot be extended to the entire U.S. population on a statistical basis. However, the results of this study may have implications for other groups on a practical basis.

The following statements summarize the major findings of this study:

1. Adults were more knowledgeable and had more positive perceptions of agriculture than high school students.

2. Respondents were most knowledgeable about the Natural Resources concept and least knowledgeable about the Agricultural Policy and Plants in Agriculture concepts.

3. Respondents were most positive about the Natural Resources concept and least positive about the Agricultural Policy concept.

4. White respondents were more knowledgeable about Agricultural Literacy concepts than black respondents.

5. There was no difference among the ethnic groups' perceptions of agriculture.

6. Respondents living on farms were more knowledgeable about agriculture than their rural non-farm neighbors, who were more knowledgeable than their urban counterparts.

7. Respondents living on farms had more positive perceptions of agriculture than those living in rural or urban areas.

8. Respondents from larger farms were more knowledgeable and had more positive perceptions about agriculture than respondents from smaller farms or not from a farm.

9. Respondents with higher levels of education were more knowledgeable about agriculture than those with less education.

10. Respondents who were more knowledgeable about agriculture also had more positive perceptions of agriculture.

11. Respondents from smaller cities and towns were more knowledgeable about agriculture than those from larger cities.

12. The Urban Missouri Adult group was the most knowledgeable about agriculture and the Michigan High School group was the least knowledgeable about agriculture.

13. Each respondent group had relatively positive perceptions of agriculture.

14. There was no difference in the agricultural knowledge levels of adults from rural Missouri than those from urban Missouri.

As a result of the findings identified above, several recommendations are offered. The following statements highlight the primary recommendations resulting from this study:

1. Elementary and secondary schools should integrate instruction about agriculture throughout the curriculum.

2. Agricultural literacy instructional efforts should target inner city minority students.

3. Agricultural literacy programs for adults should be conducted in urban areas utilizing the television media.

4. The USDA should develop a National Center for Agricultural Literacy to coordinate agricultural literacy efforts at the national level.

5. Current and future teachers should be provided with the assistance necessary to enable them to integrate instruction about agriculture, food, and natural resources into their curricula.

6. Undergraduate degree programs in institutions of higher education in the U.S. should include instruction about the significance of agriculture, food, and natural resources as a component of general education degree requirements for all students.

7. A National Conference on Agricultural Literacy should be planned and conducted to increase the awareness of the agricultural literacy issue.

This nation has a rich heritage in agriculture. Future generations depend heavily on the ability of the agriculture industry to produce food, clothing, and raw materials for shelter and industrial applications. Therefore, a national effort to enhance agricultural literacy should be elevated to a high priority in this country.

Failure to educate the American public about the production and marketing of agricultural products may place the industry in jeopardy. The security of the industry will be directly influenced by policies developed by groups and individuals with limited agricultural knowledge and experience. Therefore, it is imperative that every citizen develop a basic understanding of and appreciation for the industry of agriculture. To do less would place unnecessary risk on the industry which is so vital to our future well-being.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS i

EXECUTIVE SUMMARY ii

INTRODUCTION 1

PURPOSE 7

PROCEDURES 8

RESULTS 15
- Description of Respondents 15
- Knowledge and Perceptions of Agriculture 21
- All Groups 28
- Indiana High School Group 33
- Michigan High School Group 37
- Rural Missouri Adult Group 41
- Urban Missouri Adult Group 45

MAJOR FINDINGS 50

DISCUSSION AND RECOMMENDATIONS 52

SUMMARY 59

REFERENCES 60

APPENDIX A
- Knowledge Statement Responses by Group 61

APPENDIX B
- Data Charts 70

APPENDIX C
- Data Collection Instrument 83

TABLE OF TABLES

Table	Title	Page
1.	Comparison of Agricultural Literacy Concept Areas	12
2.	Demographic Characteristics of Respondent Groups	16
3.	Means and Standard Deviations of Agriculture Knowledge and Perception Scores by Respondent Group	23
4.	Percentage of Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly	25
5.	Stepwise Regression Analysis of the Overall Knowledge of Agriculture Score for all Respondents	28
6.	ANOVA of the Overall Knowledge of Agriculture Score by Respondent Group	29
7.	Stepwise Regression Analysis of the Overall Perception of Agriculture Score for All Respondents	31
8.	ANOVA of the Overall Perception of Agriculture Score by Respondent Group	32
9.	Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Indiana High School Group	35
10.	Stepwise Regression Analysis of the Perception of Agriculture Score for the Indiana High School Group	36
11.	Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Michigan High School Group	39
12.	Stepwise Regression Analysis of the Perception of Agriculture Score for the Michigan High School Group	41
13.	Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Rural Missouri Adult Group	43
14.	Stepwise Regression Analysis of the Perception of Agriculture Score for the Rural Missouri Adult Group	45
15.	Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Urban Missouri Adult Group	47

16. Stepwise Regression Analysis of the Perception of Agriculture Score for the Urban Missouri Adult Group 49

17. Percentage of Indiana High School Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly 62

18. Percentage of Michigan High School Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly 64

19. Percentage of Rural Missouri Adult Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly 66

20. Percentage of Urban Missouri Adult Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly 68

INTRODUCTION

Throughout the history of the United States, agriculture has contributed greatly to the country's economic development. Prior to the 1920's and 30's, a majority of citizens were directly involved in producing the food needed to feed their own families. Subsequent to the industrial, mechanical, and chemical revolutions, the number of persons directly employed in production agriculture declined. However, as noted by Adkisson (1990), every citizen has a vested interest in agriculture.

During the 20th century, this country was transformed from an agrarian society into one in which over 97% of all employed persons do not produce their own food. Rather, they are free to manufacture other products or provide services which are characteristic of highly industrialized nations (Nipp, 1988). This transformation has contributed to the relatively high standard of living enjoyed by most citizens of the United States. Although this country's dependence on an inexpensive, abundant, and safe supply of food and agricultural products has not diminished; the production of agricultural products has become concentrated in the hands of fewer producers.

Coinciding with the decline of employment in production agriculture there has been a diminished representation of broad agricultural interests in Congress and many state legislatures. Mayer and Mayer (1974) reported that:

> . . . only politicians identified with a farming interest have been willing to serve on the Agriculture committee and subcommittees. This self-selection has tended to foster large-scale government programs designed to benefit narrow classes of producers without regard for consumers or even an overall production policy. (p. 91)

The majority of state and national legislative representatives have been elected from non-agricultural districts and few have any direct relationship with agriculture. The number

of politicians who analyze agriculture questions and issues from the perspective of a consumer, rather than a producer, is increasing (Nipp, 1988). This shift has and will continue to impact the development of agricultural policies in this country. The change in focus from production-oriented food and agricultural policies to consumer-oriented policies has the potential to dramatically affect the stability and reliability of the food production and distribution system in this country.

Although direct involvement in production agriculture has declined, increasing numbers of citizens in this country have become more vocal about issues related to agriculture, food, and natural resources. Public response to the use of the pesticide Alar on the Washington apple crop and BST (Bovine Somatotropin) in the dairy industry are two illustrations of the extent to which the consuming public has recently reacted to issues in the agriculture and food industry. However, public beliefs, attitudes, and actions have often resulted from biased or inaccurate information. The public perception of agriculture appears to have been influenced by pressure from special interest groups and information provided through the news media. For example, special interest groups have engaged in destruction and thefts at animal diagnostic laboratories and university research facilities across the country. These groups have led the public to a biased and myopic view of the role and purpose of animal experimentation and scientific research in agriculture and medicine.

Another major misconception is the view that many people have expressed with regard to funding appropriations for the United States Department of Agriculture (USDA). Articles in national newspapers and magazines have led people to believe that the USDA budget is solely appropriated to subsidize farmers. There is usually no mention of the fact that the

biggest proportion of USDA budget provides support for the Food Stamp program in the Division of Food and Nutrition Services.

The United States Congress approved the federal budget for fiscal year 1993 in the amount of 1.516 trillion dollars. The total amount appropriated to the USDA was $59.4 billion (Budget for the United States Government, Fiscal Year 93, Part One, p. 29). Of the $59.4 billion budgeted for the USDA, $23.362 billion was directed toward the Food Stamp program. This represents 39 percent of the total budget appropriated to the USDA for fiscal year 1993. In contrast, the Cooperative Extension Service, the Agricultural Stabilization and Conservation Service (ASCS), and the Farmers Home Administration (FmHA) combined, were appropriated only $1.860 billion for fiscal year 1993. This figure accounts for only 3 percent of the total budget appropriated to the USDA. (Budget for the U.S. Govt, FY 93, Appendix one, pp. 269-303).

Mawby (1984) supported the need to educate the public about agriculture when he wrote: "Many bad decisions affecting food production can be traced to a lack of understanding about agriculture on the part of the 97 percent of our people who don't live on farms" (p. 72). In order for citizens to make reasoned and intelligent decisions about policies and issues affecting agriculture, there is a need for all citizens to possess a minimum level of understanding about agriculture, food, and food production, i.e., **AGRICULTURAL LITERACY** (Russell, McCracken, and Miller, 1990). Frick (1992) defined agricultural literacy in the following manner:

> Agricultural literacy is understanding and possessing knowledge of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture. Basic agricultural knowledge includes: production of plant and animal products, the economic impact of

> agriculture, its societal significance, agriculture's important relationship with natural resources and the environment, the marketing and processing of agricultural products, public agricultural policies, the global significance of agriculture, and the distribution of agricultural products. (p. 41)

Agricultural literacy is based on the belief that every citizen should possess a minimum level of knowledge of the industry which produces and markets the food needed for human survival. The rationale to support the development of agricultural literacy is based on the assumption that as societal awareness of problems and issues facing agriculture and food production increases, public pressure will increase for the development of policies which are mutually beneficial for both consumers and producers. Mawby (1990, p. 72) noted that by ". . . educating Americans in the wise management of food supplies and related renewable resources, we can anticipate more knowledgeable decision-making about agriculture in the future."

Men and women of all ages and ethnic groups have a vested interest in agriculture (Law and Pepple, 1990). Consumers as well as policy makers need to be "agriculturally literate" in order to respond appropriately as issues arise. Most Americans, whether young or old, have limited knowledge about agriculture and food production. While it may be difficult for the general public to define the term "agricultural literacy," many would agree with the need for a basic understanding of agriculture, the agricultural industry, its importance to our country and citizens. The National Research Council report on agricultural literacy (Understanding Agriculture: New Directions for Education, 1988) noted that:

> Most Americans know little about agriculture, its social and economic significance in the United States, and particularly, its link to human health and environmental quality. Few systematic education efforts are made to teach or otherwise develop agricultural literacy in students of any age . . . (p. 9)

This is why the National Research Council (1988, p. 2) recommended that: "Beginning in kindergarten and continuing through twelfth grade, all students should receive some systematic instruction about agriculture."

Agriculture, food, and food production are basic to human welfare and have contributed significantly to our history and culture (National Research Council, 1988). The future of mankind is directly dependent upon agriculture. An educated citizenry is needed to ensure the preservation of the industry which produces the food needed to satisfy the most basic of human needs (Birkenholz, 1990). Hamlin (1962) clearly outlined the need for U.S. citizens to be agriculturally literate when he wrote:

> They must accept the fact that the public policy which governs and controls agriculture is policy they make, not policy which farmers make. They must be sufficiently aware of the revolution in agriculture and its implications to approve polices which will sustain and improve agriculture and be fair to the people who engage in it, recognizing that in their blindness they could "kill the goose that laid the golden egg." (p. 58).

Mawby (1984), in an editorial titled "Agricultural Colleges Must Take the Lead in Ending Ignorance About Farming" in The Chronicle of Higher Education, described the role of land grant colleges and universities in educating non-farm people about agriculture when he wrote:

> A variety of institutions can play a role in shaping the direction of American agriculture, but none is more qualified than the land grant colleges of agriculture, with their unique tradition of research, teaching, and extension. Taken collectively, these institutions can educate or influence both the people and the processes affecting the future of agriculture. (p. 72)

To address the problem of a society which has become increasingly illiterate (in an

agricultural sense) with each passing generation (Birkenholz, 1990), there was a need to assess the knowledge and perceptions of United States citizens regarding agriculture, food, and food production. Land grant colleges of agriculture are uniquely situated to address the needs of an agriculturally illiterate society. Identifying shortfalls and misconceptions in the public's knowledge of agriculture is prerequisite to charting an appropriate course of action.

High school students were included in this study in response to the results of previous research sponsored by the Farm Foundation (1989). A sample of high school students completing the ACT test in 1988 were surveyed to determine their perceptions of college majors and careers in agriculture, and factors that influence their choice of college majors and careers. As a result of the research it was concluded that students who did not plan to major in agriculture in college:

> . . . had limited awareness of agriculture colleges, agriculture majors, and agriculture careers; most of what these students did know appeared to have come from media sources, particularly television. In addition, most of the students . . . appeared to have had many misperceptions about agriculture-related careers and majors . . . (Farm Foundation, 1989, p. ii)

The study also reported the mass media had a significant influence on student perceptions of careers in agriculture and that many students noted that "the media promotes a negative image of agriculture-related careers" (p. 3).

PURPOSE

The purpose of this pilot study was to assess the agricultural knowledge and perceptions of U.S. citizens. Since this study was a pilot project, subgroups of the U.S. population were assessed to provide baseline data reflecting the knowledge and perceptions of U.S. residents regarding agriculture and the food industry.

It should be recognized that the data collected from respondents cannot be generalized to the entire U.S. population in a statistical manner. However, the findings reported may have practical implications for food and agriculture policy makers and should direct researchers to further examine the issue of agricultural literacy in this country. The data, findings, and conclusions resulting from this study were developed to provide preliminary information pertaining to the need to develop strategies to address the agricultural literacy issue.

Five objectives were specified for this study as follows:

1. To assess the level of agricultural literacy among rural and urban adults in Missouri.
2. To assess the level of agricultural literacy among non-minority high school seniors in Indiana.
3. To assess the level of agricultural literacy among minority high school seniors in Michigan.
4. To determine if there is a difference in the level of agricultural literacy among states, age groups, or ethnic groups.
5. To develop strategies to improve the level of agricultural literacy among respondent groups.

The above objectives were specified to allow for an examination of a unique segment of the U.S. population with regard to Agricultural Literacy. It should be recognized, however, that the data collected from each subgroup or strata is not necessarily representative of the entire U.S. population or even of the strata from which they were drawn.

PROCEDURES

This project was conducted as a cooperative venture among researchers from the University of Missouri-Columbia, Lincoln University, Michigan State University, and Purdue University. Researchers from each institution were assigned responsibility to collect data from one of the target groups identified in the objectives of the project. Representatives from Lincoln University collected data from adults in urban areas of Missouri. Data from adults in rural Missouri were collected by researchers from the University of Missouri-Columbia. Data from predominantly white high school seniors were collected in Indiana by a research team member from Purdue University, and data from predominantly black high school seniors in Michigan were collected by a research team member from Michigan State University.

In order to collect comparative data, a common data collection instrument was developed for this study. The data collection instrument was designed by the research team and was based on the eleven Agricultural Literacy concept areas identified by Frick (1991). The eleven concept areas were:

1. Agriculture's relationship with the environment.
2. Processing agricultural products.
3. Public agriculture policies.
4. Agriculture's relationship with natural resources.
5. Production of animal products.
6. Societal significance of agriculture.
7. Production of plant products.
8. Economic impact of agriculture.
9. Marketing agricultural products.
10. Distribution of agricultural products.

11. Global significance of agriculture.

The data collection instrument consisted of three sections, including knowledge statements, attitude statements, and demographic items. Initially, six definitive statements were included for each of the 11 concept areas, for a total of 66 knowledge statements. Also, six perception statements were included for each of the 11 concept areas, for a total of 66 perception statements. Demographic information was requested from respondents to facilitate a more thorough analysis of the data.

The first section of the data collection instrument, (see Appendix A) containing the 66 knowledge statements, directed respondents to answer either "True," "False," or "Don't Know" to each statement. After the data were collected, the responses were re-coded into dichotomous data whereby a correct response received a score of "1" and an incorrect or "Don't Know" response received a score of zero ("0"). This scoring procedure allowed the summation of knowledge scores within each concept area and for the overall knowledge section of the data collection instrument. The range of possible knowledge scores varied from zero (0) to 66.

The second section of the data collection instrument consisted of 66 perception statements to which respondents were directed to use a Likert-type scale ranging from Strongly Agree (1), to Neutral (3), to Strongly Disagree (5). Several statements in the perception section were negatively worded. Therefore, prior to data analysis, the response scale for negatively worded items was reversed to facilitate the summation of the responses for each concept area and an overall perception score. Therefore, the maximum possible range of overall perception scores varied from 66 (lower score indicated a more positive perception) to 330 (higher score indicated a less positive or negative perception).

The third section of the data collection instrument directed respondents to provide

personal and situational demographic information. Respondents were asked to provide information concerning their:

1. Gender
2. Ethnicity
3. Home location
4. Population of nearest town/city
5. Size of farm (if any)
6. Relatives who lived or worked on a farm
7. Relatives who worked in an agricultural business
8. Enrollment in high school agriculture courses
9. Membership in FFA
10. Membership in 4-H
11. Involvement in raising animals or pets
12. Involvement in raising plants, gardens, crops
13. Regular use of the following sources of news:
    a. news magazines
    b. newspapers
    c. radio
    d. television
14. Highest grade level completed

A pilot test of the data collection instrument was conducted using four class sections of a World Food and Society course taught at Southeast Missouri State University in Cape Girardeau, Missouri during fall semester, 1992. Instrument reliability was assessed using data collected during the pilot test.

The reliability of the knowledge section of the instrument was assessed by calculating a Kuder-Richardson 20 (KR-20) coefficient over all 66 knowledge statements. The KR-20 computed for the knowledge section of the instrument was .85. The perception section of the instrument was assessed by computing a Cronbach's alpha coefficient as a measure of

instrument reliability. The Cronbach's alpha coefficient computed for the 66 items included in the perception section was .90.

Instrument validity was examined in several ways. The original instrument was based on the eleven agricultural literacy concept areas identified in the delphi study conducted by Frick (1991). In addition, a national panel of experts in agricultural literacy reviewed the instrument for content validity. In the judgement of the expert panel, the instrument was considered to be a valid tool for use in assessing the eleven agricultural literacy concepts.

Following the pilot test and as a result of the data analyzed, the 11 concept areas were collapsed into 7 concept areas (see Table 1). The concept relating to the Environment was merged into the Natural Resources concept. The Global Significance concept was merged with the Societal Significance concept into a new concept area titled Significance. The Public Agricultural Policies concept was merged with the Economic Impact concept into a new concept area titled Policy. And lastly, the Distribution of Agricultural Products concept was merged with the Marketing Agricultural Products concept into a new concept area titled Marketing.

Table 1

Comparison of Agricultural Literacy Concept Areas

Concept Areas Identified by Frick (1991)	Titles of Merged Concept Areas Used In This Study
Societal Significance of Agriculture	Significance
Global Significance of Agriculture	
Public Agricultural Policies	Policy
Economic Impact of Agriculture	
Agriculture's Relationship with the Environment	Natural Resources
Agriculture's Relationship with Natural Resources	
Production of Plant Products	Plants
Production of Animal Products	Animals
Processing Agricultural Products	Processing
Marketing Agricultural Products	Marketing
Distribution of Agricultural Products	

After collapsing the eleven concept areas into seven, the number of items included in each concept area was also reduced from six to five. The seven agricultural literacy concept areas in the knowledge section of the instrument each contained five items, for a total of 35 knowledge items. Therefore, the knowledge scale for data included in this report ranged from 0 to 35.

The seven agricultural literacy concept areas in the perception section of the instrument each contained five items also, for a total of 35 items. However, the response scale for each item was from 1 to 5; therefore, the perception scale for data included in this report ranged from 35 (most positive) to 175 (least positive).

Data were collected from the four respondent groups between October, 1992 and February, 1993. Cluster sampling was the primary sampling technique used to identify respondents.

Respondents representing the Indiana High School Student group were purposely selected from one urban and one rural high school in the state. The instrument was administered to all senior students in each school. The data were collected on a single day at each school. There was no attempt to secure data from students who were absent on the day of data collection.

Respondents representing the Michigan High School Student group were purposely selected from one inner city Detroit High School. Data instruments were completed by all students in primarily senior classes. Again, there was no attempt to collect data from students who were absent on the day the data were collected.

Data from respondents representing the Rural and Urban Missouri Adult groups were collected in a variety of settings. Individuals and groups of adults were asked to complete survey instruments in churches, community meetings, libraries, grocery stores, and shopping

malls. The data representing the Urban Missouri Adult group was collected from adults primarily in St. Louis, Kansas City, and Springfield, Missouri. Each city had a population in excess of 100,000.

Data for the Rural Missouri Adult group were collected from numerous small towns distributed throughout the state. The criterion for inclusion in the sample was that the town had a population of less than 25,000.

Two student research assistants were employed and trained to collect the data. One student was assigned to collect data from the Rural Missouri Adult group and the other student was assigned to collect data from the Urban Missouri Adult group. Completed data collection instruments were forwarded to the University of Missouri campus. The data were collected using optically scanned answer sheets which instructed respondents to indicate their responses using #2 lead pencils.

The data were scanned into a computer data file by the Center for Educational Assessment at the University of Missouri. The data files were then electronically transferred to a separate account for data analysis. Data analysis was completed using procedures available through the Statistical Analysis System (SAS) on the University of Missouri mainframe computer.

RESULTS

Description of Respondents

The data collected as part of this study represents four major subgroups of the U.S. population. However, it should not be inferred that the results of this study are generalizable to the U.S. population. Findings and conclusions drawn from this study may have implications for the U.S. population, but the results should be interpreted with caution.

The data presented in Table 2 provide an indication of the demographic characteristics of the respondent groups. In total, there were 2,005 individuals who provided responses which were used for data analysis. The four subgroups reported in Table 2 included: Group 1 = Indiana High School; Group 2 = Michigan High School; Group 3 = Rural Missouri Adults; and Group 4 = Urban Missouri Adults. The Indiana High School group consisted of 668 students from four predominantly white high schools in Indiana; one near South Bend, one in Indianapolis and two from rural Indiana. The Michigan High School group consisted of 453 students from one predominantly black high school in Detroit, Michigan. The Rural Missouri Adult group consisted of 456 adult respondents from predominantly rural Missouri areas. The Urban Missouri Adult group consisted of 428 adult respondents from predominantly urban areas of Missouri.

Slightly over half (52.2%), of all the respondents were female and 47.7 percent were male. The ethnic background of the respondents was 55 percent white, 35 percent black, 5 percent hispanic, 3 percent asian, and 2 percent other races. However, within each of the four subgroups there were large variations in the ethnicity of the respondents.

Table 2

Demographic Characteristics of Respondent Groups

Characteristic		Group[a]				Overall (n=2005)
		1 (n=668)	2 (n=453)	3 (n=456)	4 (n=428)	
Gender -	Female	50.5[b]	58.1	56.9	44.3	52.2
	Male	49.4	41.9	43.1	55.7	47.7
Ethnicity -	Asian	4.7	0.9	0.9	5.5	3.1
	Black	3.5	86.3	32.7	32.6	35.0
	Hispanic	1.2	2.7	0.9	16.3	4.7
	White	88.5	6.7	65.1	42.9	55.1
	Other	2.1	3.4	0.4	2.6	2.1
Home -	Farm	10.1	5.1	13.4	1.5	8.0
	Rural Area	41.1	0.5	18.5	6.6	19.5
	Town/City	48.8	94.4	68.1	91.9	72.5
Population -	< 2,500	19.3	4.8	21.8	7.7	14.2
	2,501 - 10,000	30.1	5.9	71.8	1.9	28.4
	10,001 - 25,000	5.8	4.3	0.7	13.5	5.9
	25,001 - 100,000	41.2	3.9	2.2	16.6	18.7
	> 100,000	3.6	81.1	3.5	60.2	32.9
Size of Farm -	No farm	84.0	89.6	83.9	93.9	87.3
	10-50 acres	6.6	4.8	2.9	4.4	4.9
	51-200 acres	2.6	3.4	3.4	0.7	2.6
	201-750 acres	2.9	1.4	8.3	1.0	3.4
	> 750 acres	3.8	.1	1.6	0.0	1.8
Relatives on Farm -	Yes	48.5	37.2	61.6	17.8	42.5
	No	51.5	62.6	38.4	82.2	57.4
Relatives in Agribusiness -	Yes	36.3	28.2	51.3	28.6	36.3
	No	63.7	71.8	48.7	71.4	63.7
High School Agriculture -	Yes	18.1	16.8	23.7	35.4	22.8
	No	81.9	83.2	76.3	64.6	77.2
FFA Member -	Yes	9.6	5.6	19.4	6.7	10.4
	No	90.4	94.4	80.6	93.3	89.6
4-H Member -	Yes	26.7	16.8	42.5	11.1	24.9
	No	73.3	83.2	57.5	88.9	75.1
Raised Animals or Pets	Yes	79.9	77.8	81.3	67.1	77.0
	No	20.1	22.2	18.7	32.9	23.0

Characteristic		Group[a]				Overall (n=2005)
		1 (n=668)	2 (n=453)	3 (n=456)	4 (n=428)	
Raised Plants, Gardens, or Crops	Yes	63.3	57.5	82.6	56.4	65.1
	No	36.7	42.5	17.4	43.6	34.9
Read News Magazines -	Yes	41.6	42.5	49.4	51.6	45.7
	No	58.4	57.5	50.6	48.4	54.3
Read Newspaper -	Yes	72.0	68.4	83.4	79.3	75.5
	No	28.0	31.6	16.6	20.7	24.5
Listen to Radio -	Yes	86.7	90.5	90.2	85.6	88.1
	No	13.3	9.5	9.8	14.4	11.9
Watch Television -	Yes	88.1	81.3	96.0	94.9	89.9
	No	11.9	18.7	4.0	5.1	10.1
Highest Grade Completed:						
< = 8th grade		1.8	1.9	6.4	2.7	3.1
9-10th grade		1.4	2.6	7.0	1.7	3.0
11-12th grade		94.8	95.1	49.6	22.8	69.1
some college		1.1	0.5	21.8	57.3	17.7
B.S. or more		0.9	0.0	15.2	15.5	7.1

[a]Group was coded: 1 = Indiana High School; 2 = Michigan High School; 3 = Rural Missouri Adults; 4 = Urban Missouri Adults

[b]Data are percentages rounded to nearest decimal point.

The Indiana High School group was 88 percent white. The Michigan High School group was 86 percent black. The adult respondent groups from Missouri were of mixed ethnicity. The Rural Missouri Adult group consisted of 33 percent black and 65 percent white respondents, and the Urban Missouri Adult group consisted of 33 percent black, 16 percent hispanic, and 43 percent white respondents.

Only 8 percent of all respondents indicated their home was located on a farm. However, within each subgroup the percentages ranged from a low of 1.5 percent for the Urban Missouri Adult group to a high of 13.4 percent for the Rural Missouri Adult group. Over 90 percent of the Michigan High School group and Urban Missouri Adult group indicated their home was located in a town or city.

Respondents were asked to indicate the population of the town nearest their home. From the data collected, there appeared to be a bi-modal distribution among all respondents, with 43 percent indicating the town nearest their home had a population of less than 10,000 people. On the other hand, nearly 52 percent of the respondents indicated the nearest town or city had a population of over 25,000. When examined by subgroup, it was observed that the Indiana High School group was approximately equally split, with 49.4 percent reporting a population less than 10,000 and 44.8 percent reporting a population of greater than 25,000. Over 80 percent of the Michigan High School group reported the population of the nearest town to be over 100,000 people. The Rural Missouri Adult group had 93.6 percent of the respondents who indicated the town nearest there home had a population of less than 10,000. The Urban Missouri Adult group included 76.8 percent of the respondents who lived in or near a town or city with a population of 25,000 or more.

Respondents were asked to provide information regarding the size of their farm if they resided on a farm. For each of the four groups, over 80 percent of the respondents indicated that they did not reside on a farm. The distribution of responses for the size of farm yielded different results among the four respondent subgroups. The Indiana High School group reflected a dispersion among the four farm size categories in which 6.6 percent of the respondents reported a farm size of from 10-50 acres and 3.8 percent reported a farm size of

greater than 750 acres. The Rural Missouri Adult group had 8.3 percent of its respondents reporting a farm size of 201-750 acres, with smaller percentages for the other farm size categories. For each subgroup, the percentage of respondents in each farm size category was less than 5 percent.

Over half (57.4%) of all respondents reported having no relatives who lived or worked on a farm; however the proportions varied considerably among the respondent groups. The Indiana High School, Michigan High School, and Urban Missouri Adult groups revealed that over half of the respondents did not have relatives who lived or worked on a farm. However, the Rural Missouri Adult group reported that over 60 percent had relatives who lived or worked on a farm. The same situation occurred with regard to respondents' indication of relatives who worked in an agribusiness. The majority of respondents in the Indiana High School, Michigan High School, and Urban Missouri Adult groups indicated they did not have relatives who worked in an agribusiness. However, 51.3 percent of the Rural Missouri Adult group indicated they had relatives who worked in an agribusiness. In total, only one third of all respondents indicated they had relatives working in an agribusiness.

A relatively small proportion of the respondents indicated they had completed agriculture courses while they were in high school. Over three-fourths (77.2%) of all respondents reported that they had no courses in agriculture while in high school. There was some variability among the respondent groups, ranging from 35.4 percent for the Urban Missouri Adult group to 16.8 percent for the Michigan High School group.

Even smaller proportions of respondents reported having been an FFA member while they were in high school. Only 5.6 percent of the Michigan High School group had been FFA members, while 19.4 percent of the Rural Missouri Adult group had been in the FFA.

Overall, 10.4 percent of the respondents indicated they had been members of the FFA organization.

Nearly one-fourth (24.9%) of all respondents indicated they had been members of a 4-H club. Membership in 4-H ranged from a high of 42.5 percent of the Rural Missouri Adult group to a low of 11.1 percent in the Urban Missouri Adult group. The Michigan High School group reported 16.8 percent had been in 4-H, while the Indiana High School group revealed that 26.7 percent had been 4-H members.

Nearly 80 percent of all respondents reported that they had experience in raising animals or pets. Although there was some variation among the respondent groups, the range was from 67.1 percent for the Urban Missouri Adult group to 81.3 percent for the Rural Missouri Adult group.

A similar response pattern emerged with regard to the experience of respondents in raising plants, gardens, or crops. Overall, 65 percent of all respondents indicated they had raised plants, gardens, or crops. Again, the variation among respondent groups ranged from 56.4 percent for the Urban Missouri Adult group to 82.6 percent for the Rural Missouri Adult group.

Respondents were asked to identify their use of four media sources for news. The responses were quite similar among the four respondent groups. Slightly less than half (45.7%) of the respondents reported reading magazines regularly as a news source. However, over three-fourths of all respondents reported that they used newspapers (75.5%); radio (88.1%); and television (89.9%) regularly as a source of news.

Respondents were asked to indicate the highest level of education they had attained by checking one of five categories provided on the data collection instrument. Nearly 95 percent

of the Indiana High School and Michigan High School groups reported having completed the 11th or 12th grade. Nearly half of the Rural Missouri Adult group had completed the 11th/12th grade, 13.4 percent had completed the 10th grade or below, and 37 percent had completed some college education. The Urban Missouri Adult group consisted of 22.7 percent who had an 11th or 12th grade education, 4.4 percent with a 10th grade education or below, and 72.8 percent who had completed some college. Slightly over 15 percent of the Rural Missouri Adult and Urban Missouri Adult groups had completed a B.S. degree. However, over half (57.3%) of the Urban Missouri Adult group had completed some college, while less than a quarter (21.8%) of the Rural Missouri Adult group had completed some college course work.

Knowledge and Perceptions of Agriculture

Data presented in Table 3 include means and standard deviations for the knowledge of agriculture and perception of agriculture scores for all respondents and each group, respectively. Scores are included for the overall knowledge and perception scale in addition to each of the seven concept areas comprising agricultural literacy.

The overall mean knowledge of agriculture score was 22.19, and ranged from a low of 16.95 for the Michigan High School student group to a high of 24.68 for the Urban Missouri Adult group.

Overall mean knowledge scores for the seven concept areas ranged from a high of 3.58 for the Natural Resources concept to a low of 2.79 for the Plants in Agriculture concept area. Other concept areas, including Marketing (3.28), Significance of Agriculture (3.30), and Animals in Agriculture (3.44), produced overall means knowledge scores above the 3.0 level.

The Processing (2.99) and Policy (2.83) concepts produced overall mean knowledge scores below the 3.0 level.

When examined by respondent group it was observed that the Michigan High School group produced the lowest group mean knowledge score for each of the seven concept areas. The Indiana High School group produced the highest group mean knowledge score for the Significance of Agriculture and Natural Resources concept areas. The Urban Missouri Adult group produced the highest group mean knowledge score for the other five concept areas.

The overall mean perception of agriculture score was 80.65. Group perception of agriculture means ranged from a low (more positive perception) of 73.97 for the Rural Missouri Adult group to a high (less positive perception) of 85.79 for the Michigan High School group. The scores, when computed to the original scale values, aligned with the "agree" descriptor on the perception scale.

The overall mean concept perception scores ranged from 10.81 for the Natural Resources area to 12.70 for the Agricultural Policy area. Each of the other five concept areas produced overall perception means between 11.13 and 11.84.

When examined by respondent group it was determined that the two adult groups produced the lowest mean perception of agriculture scores for each of the seven concept areas. The Rural Missouri Adult group produced the lowest perception means for the Significance, Natural Resources, Animals in Agriculture, Plants in Agriculture, Processing, and Marketing concept areas. The Urban Missouri Adult group produced the lowest perception means for the Agricultural Policy and Plants in Agriculture concept areas.

Table 3

Means and Standard Deviations of Agriculture Knowledge and Perception Scores by Respondent Group

Domain / Concept Area	Overall	Group[a]				Overall (n=2005)
		1 (n=668)	2 (n=453)	3 (n=456)	4 (n=428)	
Knowledge:	Total	22.77[b] / 5.38	16.95 / 6.46	24.25 / 6.72	24.68 / 4.49	22.19 / 6.50
	Significance	3.62[c] / 1.07	2.54 / 1.43	3.52 / 1.28	3.39 / 1.16	3.30 / 1.30
	Policy	2.84 / 1.24	2.14 / 1.64	2.95 / 1.38	3.41 / 1.16	2.83 / 1.40
	Natural Resources	3.96 / 1.01	2.91 / 1.39	3.90 / 1.27	3.33 / 0.96	3.58 / 1.23
	Plants	2.78 / 1.24	2.15 / 1.31	3.13 / 1.29	3.14 / 0.97	2.79 / 1.28
	Animals	3.27 / 1.15	2.70 / 1.31	3.87 / 1.05	4.06 / 0.98	3.44 / 1.24
	Processing	2.90 / 1.21	2.21 / 1.35	3.33 / 1.24	3.62 / 1.08	2.99 / 1.32
	Marketing	3.35 / 1.24	2.32 / 1.43	3.67 / 1.38	3.76 / 1.18	3.28 / 1.41
Perceptions:	Total	83.90 / 12.21	85.79 / 15.42	73.97 / 12.97	77.10 / 11.71	80.65 / 13.90
	Significance	11.87 / 2.68	12.48 / 3.12	10.66 / 2.82	11.02 / 2.84	11.54 / 2.92
	Policy	13.42 / 2.67	13.40 / 3.03	11.77 / 2.50	11.76 / 2.44	12.70 / 2.79
	Natural Resources	11.06 / 2.10	11.70 / 2.36	10.00 / 2.29	10.35 / 2.00	10.81 / 2.27
	Plants	11.22 / 2.22	11.89 / 2.39	11.33 / 2.50	10.25 / 2.13	10.97 / 2.40
	Animals	11.85 / 2.85	11.58 / 2.99	9.83 / 2.64	10.95 / 2.38	11.13 / 2.86
	Processing	12.34 / 3.03	12.87 / 3.54	10.66 / 3.06	11.27 / 3.48	11.84 / 3.35
	Marketing	12.13 / 2.58	12.37 / 3.40	10.57 / 2.74	11.37 / 2.98	11.66 / 2.97

[a]Group was coded: 1 = Indiana High School; 2 = Michigan High School; 3 = Rural Missouri Adults; 4 = Urban Missouri Adults.
[b]Mean / Standard Deviation.
[c]Knowledge concept scales ranged from 0 to 5; Perception concept scales ranged from 5 to 25.
Total Knowledge scale ranged from 0 to 35, total Perception scale ranged from 35 to 175.

The Indiana High School group produced the highest (least positive) perception score for one concept area -- Agricultural Policy. The Michigan High School group produced the highest or least positive mean perception of agriculture score for each of the other six Agricultural Literacy concept areas.

Individual knowledge statements were further analyzed by determining the proportion of respondents who answered each statement correctly. Table 4 presents the result of the analysis by indicating the percentage of all respondents who answered each knowledge statement correctly, incorrectly, or "don't know". Similar data tables for each respondent group are included in Appendix A.

Overall, two-thirds (63%) of the knowledge statements were answered correctly by all respondents. Slightly over 20 percent of the statements were answered incorrectly, and approximately 15 percent of the statements elicited a "don't know" response. The Natural Resources concept area produced the highest proportion of correct responses at 71.1 percent. The Agricultural Policy and Plants in Agriculture concept areas produced the lowest proportion of correct responses at approximately 55 percent.

About one-fourth of all responses were incorrect in the Agricultural Policy, Plants in Agriculture, and Agricultural Processing concept areas. Most notably, 59.1 percent of all respondents incorrectly believed that homogenization kills bacteria in milk with heat, and 54.1 percent believed that profits increase as farmers strive for maximum crop yields. Over 40 percent of the respondents thought that grain exports are usually transported between continents by airplane, and about one-third thought that farming and wildlife cannot survive in the same geographic area.

Table 4

Percentage of Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly

Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Significance of agriculture:			
There are more farmers in the U.S. than there were 10 years ago.	62.1	25.8	12.0
U.S. research has improved farming methods in other countries.	67.5	14.5	18.0
Thousands of people in the world die of starvation each year.	87.3	8.8	3.6
The average U.S. farm is larger than 500 acres.	39.5	34.9	25.5
Several countries depend on U.S. agricultural exports for food and fiber.	72.1	14.6	13.1
Concept Average	65.9	19.7	14.4
Agricultural policy:			
Less than three percent of the U.S. gross national product is from agriculture.	46.6	30.5	22.9
One of every five jobs in the U.S. is related to agriculture.	46.5	30.9	22.5
Local laws and regulations have little effect on farmers.	63.0	22.6	14.3
U.S. agricultural policies influence food prices in other countries.	67.6	15.6	16.5
Government subsidy payments to farmers are used to stabilize food prices.	55.1	22.8	21.8
Concept Average	55.9	24.5	19.6
Natural resources/environment:			
Soil erosion does <u>not</u> pollute U.S. lakes and rivers.	64.1	25.6	11.1
Many farmers use tillage practices that conserve the soil.	62.2	14.1	10.3
Farming and wildlife <u>cannot</u> survive in the same geographic area.	56.6	32.6	23.7
Animal wastes are used to increase soil fertility.	81.7	10.1	10.6
Water, soil, and minerals are important in agriculture.	89.9	6.7	8.1
Concept Average	71.1	17.8	3.0

Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Plants in agriculture:			
The use of pesticides has increased the yields of crops.	64.2	21.7	14.0
Plant products are the main source of human foods.	69.7	21.0	9.2
Biotechnology has increased the pest resistance of plants.	62.3	13.1	24.6
Profits increase as farmers strive for maximum crop yields.	29.0	54.1	16.8
Very little of the grain produced in the U.S. is exported.	52.1	27.1	20.2
Concept Average	55.8	26.8	17.0
Animal agriculture:			
Animal health and nutrition are important to farmers.	88.2	7.2	4.5
Animals can be a valuable source of medical products.	59.5	20.5	19.9
Animals eat foodstuffs that cannot be digested by humans.	58.8	27.1	13.9
Biotechnology has increased animal production in the U.S.	54.2	20.3	25.4
Hamburger is made from the meat of pigs.	80.3	12.3	5.9
Concept Average	68.6	17.5	13.9
Agricultural processing:			
Food safety is a major concern of the food processing industry.	79.7	14.1	6.1
Homogenization kills bacteria in milk with heat.	27.1	59.1	13.8
New products have been developed using surplus grains.	63.4	11.2	25.4
Pasteurization kills bacteria in milk with heat.	66.2	20.2	13.5
Using grain alcohol for fuel reduces the U.S. dependence on foreign oil.	58.4	19.6	21.3
Concept Average	59.1	24.8	16.0
Marketing and distribution:			
Processing increases the cost of food products.	73.6	13.5	12.8
The U.S. does <u>not</u> sell its feed grains on the world market.	61.8	19.0	19.1
Grain exports are usually transported between continents by airplane.	40.1	41.9	17.8
An efficient food distribution system is essential to the agricultural industry.	73.8	12.4	13.6
Transportation and storage affect the supply of agricultural products.	73.4	12.0	13.9
Concept Average	64.7	19.8	15.4
Overall Knowledge Total	63.0	21.6	15.3

In addition to statements which produced incorrect responses, a number of statements produced a relatively high proportion of "don't know" responses. The following statements resulted in a "don't know" response from over 20 percent of all respondents:

- The average U.S. farm is larger than 500 acres.
- Less than three percent of the U.S. gross national product is from agriculture.
- One of every five jobs in the U.S. is related to agriculture.
- Government subsidy payments to farmers are used to stabilize food prices.
- Many farmers use tillage practices that conserve the soil.
- Biotechnology has increased the pest resistance of plants.
- Very little of the grain produced in the U.S. is exported.
- Biotechnology has increased animal production in the U.S.
- New products have been developed using surplus grains.
- Using grain alcohol for fuel reduces the U.S. dependence on foreign oil.

Most of the 35 knowledge statements resulted in correct responses by the majority of the respondents. Statements which produced correct responses by 80 percent or more of the respondents were as follows:

- Thousands of people in the world die of starvation each year.
- Animal wastes are used to increase soil fertility.
- Water, soil, and minerals are important in agriculture.
- Animal health and nutrition are important to farmers.
- Hamburger is made from the meat of pigs (false).

All Groups

Knowledge of Agriculture

The overall knowledge of agriculture score for all groups was analyzed using stepwise regression analysis. Each demographic characteristic was included in the pool of predictor variables. Individual predictor variables were entered into the prediction equation in a stepwise manner until all characteristics which met the .05 alpha level were included. The five statistically significant predictors which were included in the overall knowledge of agriculture prediction equation are presented in Table 5.

Table 5

Stepwise Regression Analysis of the Overall Knowledge of Agriculture Score for all Respondents

Variable[a]	b	F	p
Black race	-3.92	116.88	.001
Completed 11th or 12th grade	-2.98	82.13	.001
Home in a town/city	-2.22	47.94	.001
Relatives on a farm	-1.85	43.95	.001
Completed bachelor's degree or higher	3.25	35.42	.001

[a]Variables were coded: No = 0, Yes = 1
Intercept = 29.97 Model R^2 = .30

Four of the demographic characteristics produced negative regression coefficients. The four characteristics in the order of inclusion in the prediction equation were: (a) black race, (b) completion of the 11th or 12th grade, (c) home location in a town or city, and (d) having relatives who live or work on a farm. Respondents who possessed one or more of those

characteristics tended to have lower knowledge of agriculture scores.

Having completed a bachelor's degree or higher was the only demographic characteristic that produced a positive regression coefficient. Respondents who had completed a bachelor's degree or higher tended to produce higher knowledge of agriculture scores. Collectively, the five statistically significant predictors were able to account for 30 percent of the variance associated with the overall knowledge of agriculture score for all respondents when grouped together.

An analysis of variance test was also conducted on the overall knowledge of agriculture score using respondent groups as the classification variable. The Scheffe post hoc procedure was employed to determine which of the group mean scores differed significantly. The results of the ANOVA test are reported in Table 6.

Table 6

ANOVA of the Overall Knowledge of Agriculture Score by Respondent Group

Source	df	F	p
Group	3	155.33	.001
Error	1865		
Total	1868		

Mean	Group	Groups Differing*
24.68	Urban Missouri Adult	A
24.25	Rural Missouri Adult	A
22.77	Indiana High School	B
16.95	Michigan High School	C

*Groups with similar letters are not significantly different.

The ANOVA produced an F value of 155.33, which was significant at the .001 level. The Scheffe post hoc test revealed that the group mean knowledge of agriculture scores for the Urban Missouri Adult and Rural Missouri Adult groups were higher than the Indiana High School group, which was also higher than the mean score of the Michigan High School group.

Therefore, the two adult respondent groups appeared to be more knowledgeable about agriculture than the student respondent groups. Also, the Indiana High School group appeared to be more knowledgeable about agriculture than the Michigan High School group.

Perception of Agriculture

The overall perception of agriculture score for all respondents was analyzed using stepwise regression analysis. The .05 alpha level was the criterion used to identify demographic characteristics included in the prediction equation. Results of the stepwise regression analysis for the overall perception of agriculture score are presented in Table 7.

Twelve demographic characteristics met the criterion for inclusion in the prediction equation. Six demographic characteristics produced positive regression coefficients and six characteristics produced negative regression coefficients.

The six demographic characteristics which produced positive regression coefficients were: (a) having completed the 11th or 12th grade, (b) living nearest to a town/city with a population between 10,000 and 25,000, (c) having relatives employed in an agricultural business, (d) living nearest to a town/city with a population between 25,000 and 100,000, (e) living nearest a town with a population of less than 2,500, and (f) watching television as a regular source of news. Respondents who possessed one or more of those six demographic

characteristics tended to produce less positive perception of agriculture scores.

Table 7

Stepwise Regression Analysis of the Overall Perception of Agriculture Score for All Respondents

Variable[a]	b	F	p
Completed 11th or 12th grade	8.63	161.99	.001
Population of nearest town between 10,000 - 25,000	10.55	55.53	.001
Size of farm 201 - 750 acres	-10.51	33.90	.001
Relatives employed in an agribusiness	2.98	19.96	.001
Population of nearest town between 25,000 - 100,000	4.75	31.74	.001
Population of nearest town less than 2,500	-1.84	6.90	.009
Male gender	-1.49	5.96	.015
Television news	2.94	6.95	.009
Farm size over 750 acres	-6.55	6.61	.010
Radio news	-2.20	5.35	.021
Home located in rural area	-1.85	5.18	.023

[a]Variables were coded: No = 0; Yes = 1
[b]Gender was coded: Female = 1; Male = 2
Intercept = 70.51 R^2 = .19

The six demographic characteristics producing negative regression coefficients were: (a) living on a farm of 201 to 750 acres, (b) white race, (c) male gender, (d) living on a farm of greater than 750 acres, (e) listening to the radio as a regular source of news, and (f) having a home located in a rural area. Respondents who possessed one or more of those six

demographic characteristics tended to produce more positive perception of agriculture scores.

Collectively, the twelve characteristics included in the overall perception of agriculture prediction equation explained 19 percent of the variance associated with the mean of the four groups combined.

An analysis of variance test was also conducted on the overall perception of agriculture score using respondent groups as the classification variable. The Scheffe post hoc test was employed to determine which of the group mean scores differed significantly. The results of the ANOVA test are reported in Table 8.

Table 8

ANOVA of the Overall Perception of Agriculture Score by Respondent Group

Source	df	F	p
Group	3	77.09	.001
Error	1730		
Total	1733		

Mean	Group	Groups Differing[a]
85.79	Michigan High School	A
83.90	Indiana High School	A
77.10	Urban Missouri Adult	B
73.97	Rural Missouri Adult	C

[a]Groups with similar letters are not significantly different.

The ANOVA produced an F value of 77.09, which was significant at the .001 level. The Scheffe post hoc test revealed that the perception of agriculture mean scores for the Michigan High School and Indiana High School groups were higher than the score for Urban

Missouri Adult group, which was also higher than the score for the Rural Missouri Adult group.

The Rural Missouri Adult group produced more positive perception of agriculture scores than the other three groups. The Urban Missouri Adult group produced the second most positive perception of agriculture score. And the two high school respondent groups produced the least positive perception of agriculture scores, however; the high school groups did not differ significantly from one another.

Indiana High School Group

The Indiana High School group had a relatively even gender distribution, with slightly more females than males. The group consisted primarily of white respondents (88.5%), while minorities made up about five percent of the respondents.

Nearly half of the respondents indicated that they lived in a town or city, with 45 percent of the respondents living near a town or city with a population above 25,000. Over 42 percent of the respondents indicated that they lived in a rural area.

Only nine percent of the respondents in the Indiana High School group noted that they lived on a farm. Over half of those who lived on farms reported that the size of their farm was between 10 and 50 acres. Nearly half of the respondents indicated that they had relatives who lived or worked on a farm. Approximately one-third of the group had relatives who worked in an agribusiness.

Less than one-fifth of the students had completed a high school agriculture course and less than 10 percent had been members of the FFA organization. Slightly more than 25

percent of the respondents had been 4-H members.

Over 80 percent of the students had experience in raising animals or pets. Sixty-four percent had raised plants, gardens, or crops. The Indiana High School respondents indicated television was the news source used most regularly, with radio a close second. The only news source receiving a response of less than 50 percent was news magazines.

The majority of students indicated that the highest grade level they had completed was 11th or 12th grade. Three percent of the respondents indicated that they had taken one or more courses for college credit while they were in high school.

Knowledge of Agriculture

The Indiana High School group produced a mean knowledge of agriculture score of 22.77 with a standard deviation of 5.38. The mean knowledge score was further analyzed by employing stepwise regression, utilizing the demographic characteristics as the pool of predictor variables. The .05 alpha level was established as the criterion for inclusion in the prediction equation.

The results of the stepwise regression analysis for the Indiana High School group mean knowledge of agriculture score are presented in Table 9.

Seven demographic characteristics were found to be significant predictors of knowledge of agriculture scores for the Indiana High School group. Collectively, the seven predictor variables accounted for 11 percent of the total variance in the group's knowledge of agriculture score.

Three demographic characteristics were identified which produced negative regression coefficients. Those characteristics included: (a) experience in raising plants, gardens, or

crops, (b) not living on a farm, and (c) having relatives employed in an agricultural business. It was determined that respondents who possessed one or more of those characteristics produced lower knowledge of agriculture scores than those who did not possess those characteristics.

Table 9

Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Indiana High School Group

Variable[a]	b	F	p
Male gender[b]	2.02	22.42	.001
Raised plants, gardens, or crops	-1.11	6.18	.013
White race	2.47	11.06	.001
Don't live on a farm	-1.60	6.64	.010
Relatives in an agribusiness	-0.94	4.32	.038
Radio news	1.37	4.54	.034
Home in rural area	0.89	4.22	.040

[a]Variables were coded: No = 0; Yes = 1
[b]Gender was coded: Female = 1; Male = 2
Intercept = 20.18 Model R^2 = .11

Four demographic characteristics were identified which produced positive regression coefficients. Those characteristics included: (a) male gender, (b) white race, (c) listening to radio for news, and (d) having their home located in a rural area. Seniors who possessed one or more of those characteristics produced higher knowledge of agriculture scores than those who did not possess such characteristics.

Perception of Agriculture

The Indiana High School group produced a mean perception of agriculture score of

83.90 with a standard deviation of 12.21. The perception of agriculture score was further analyzed using stepwise regression and utilized the demographic characteristics to explain the variance associated with the score. The .05 alpha level was established as the criterion for inclusion in the prediction equation.

Five demographic characteristics were found to be significant predictors of the mean perception of agriculture score for the Indiana High School respondent group. Collectively, the five predictor variables accounted for ten percent of the variance associated with the group's perception of agriculture score. The results of the stepwise regression analysis for the Indiana High School group mean perception of agriculture score are presented in Table 10.

Table 10

Stepwise Regression Analysis of the Perception of Agriculture Score for the Indiana High School Group

Variable[a]	b	F	p
Bachelor's degree or higher	-21.29	16.70	.001
Male gender[b]	-3.82	16.01	.001
Population between 25,001 and 100,000	2.84	8.50	.004
Black race	10.19	10.65	.001
Member of FFA	3.96	5.52	.019

[a]Variables were coded: No = 0; Yes = 1
[b]Gender was coded: Female = 1; Male = 2
Intercept = 81.05 Model R^2 = .10

Two demographic characteristics were identified which produced negative regression coefficients. Those characteristics included: (a) having completed a bachelor's degree or higher and (b) male gender. It was determined that respondents who possessed one or more

of those characteristics produced lower (more positive) perception of agriculture scores than those who did not possess those characteristics.

Three demographic characteristics were identified which produced positive regression coefficients. Those characteristics included: (a) living near a town or city with a population between 25,000 and 100,000, (b) black race, and (c) being a member of the FFA organization. Respondents who possessed one or more of those characteristics produced higher (less positive) perception of agriculture scores than those who did not possess those characteristics.

Michigan High School Group

The Michigan High School student group had a higher proportion of female than male respondents when compared to the general population. The group consisted primarily of black students (86.3%). White students made up about seven percent of the respondents.

Nearly 95 percent of the respondents reported that they lived in a city. Less than one percent of the respondents indicated they lived in a rural area. Over 80 percent of the respondents reported that the town or city nearest their home had a population of over 100,000 people.

Only five percent of the respondents reported that they lived on a farm. Approximately half of those who lived on farms recorded that the acreage was between 10 and 50 acres. Thirty seven percent of all Michigan High School respondents had relatives who lived or worked on a farm, and approximately one-fourth had relatives who worked in an agribusiness.

Nearly 17 percent of the respondents had completed an agriculture course, but less

than six percent had been members of the FFA organization. Almost 17 percent of the respondents had been 4-H members.

Over 77 percent of the students indicated that they had some experience in raising animals or pets, while over 57 percent indicated that they had raised plants, gardens, or crops.

Respondents in the Michigan High School group indicated radio was the news source that they used most regularly, with television a close second. Less than 50 percent of the respondents identified news magazines as a regular source for news.

The majority of students indicated that the highest grade level that they had completed was the 11th or 12th grade. However, one respondent indicated completion of a college course.

Knowledge of Agriculture

The Michigan High School group produced a mean knowledge of agriculture score of 16.95 with a standard deviation of 6.46. The mean knowledge score was further analyzed by employing stepwise regression and utilizing the demographic characteristics as the pool of predictor variables. The .05 alpha level was established as the criterion for inclusion in the prediction equation.

The results of the stepwise regression analysis for the Michigan High School group mean Knowledge of Agriculture score are presented in Table 11.

Six demographic characteristics were found to be significant predictors of knowledge of agriculture scores for the Michigan High School respondents group. Collectively, the six predictor variable accounted for 14 percent of the variance associated with the mean knowledge of agriculture score.

Three demographic characteristics were identified which produced negative regression coefficients. Those characteristics included: (a) having relatives on a farm, (b) reading news magazines regularly, and (c) having experience raising plants, gardens, or crops. Respondents who possessed one or more of those characteristics produced lower knowledge of agriculture scores than respondents who did not possess such characteristics.

Table 11

Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Michigan High School Group

Variable[a]	b	F	p
Relatives on a farm	-2.77	11.59	.001
Member of 4-H	5.38	16.19	.001
News magazines	-2.37	10.02	.002
Population between 25,001 and 100,000	4.65	6.24	.013
Raised plants, gardens, or crops	-1.80	5.56	.019
Male gender[b]	1.56	4.57	.033

[a]Variables were coded: No = 0; Yes = 1
[b]Gender was coded: Female = 1; Male = 2
Intercept = 15.01 Model R^2 = .14

Three demographic characteristics were identified as producing positive regression coefficients. Those characteristics were: (a) member of 4-H, (b) living nearest to a town or city with a population between 25,001 and 100,000, and (c) male gender. Respondents who possessed one or more of these characteristics produced higher Knowledge of Agriculture

scores than those who did not possess those characteristics.

Perception of Agriculture

The Michigan High School Student group produced a mean perception of agriculture score of 85.79 with a standard deviation of 15.42. The Perception score was further analyzed by employing stepwise regression and utilizing the demographic characteristics to account for the variance associated with the Michigan High School group mean perception of agriculture score. The .05 alpha level was selected as the criterion for including variables in the prediction equation.

Five demographic characteristics were found to be significant predictors of the mean perception of agriculture score for the Michigan High School respondent group. Collectively, the five predictor variables accounted for 16 percent of the total variance in the group's mean perception of agriculture score. The results of the stepwise regression analysis for the Michigan High School group mean perception of agriculture score are presented in Table 12.

Two demographic characteristics were identified which produced negative regression coefficients. Those characteristics were: (a) male gender and (b) living on a farm of 201 to 750 acres. Respondents who possessed one or more of those characteristics produced lower (more positive) perception of agriculture scores than those who did not possess those characteristics.

Three demographic characteristics were identified which produced positive regression coefficients. Those characteristics included: (a) having their home located on a farm, (b) "other" race, and (c) having completed the 11th or 12th grade. Respondents who possessed one or more of the characteristics produced higher (less positive) perception of agriculture

scores than those who did not possess such characteristics.

Table 12

Stepwise Regression Analysis of the Perception of Agriculture Score for the Michigan High School Group

Variable[a]	b	F	p
Home on a farm	23.30	36.55	.001
Other race	20.66	9.98	.002
Completed 11th or 12th grade	11.68	6.33	.012
Male gender[b]	-3.35	4.73	.030
Size of farm 201 - 750 acres	-25.27	3.89	.049

[a]Variables were coded: No = 0; Yes = 1
[b]Gender was coded: Female = 1; Male = 2
Intercept = 75.94 Model R^2 = .16

Rural Missouri Adult Group

The Rural Missouri Adult group had a higher proportion of female respondents with fewer male respondents than the overall sample. The group consisted of approximately two-thirds white and one-third black respondents.

Although 68 percent of the Rural Missouri Adult group indicated their home was located in a town or city, 93.6 percent indicated the population of the nearest town to be less than 10,000.

Slightly over 13 percent of the respondents lived on farms and two-thirds of the farms were between 201 and 750 acres. Nearly two-thirds of the respondents had relatives living or

working on a farm, and slightly over half had relatives working in an agricultural business.

Approximately one-fourth of the Rural Missouri Adult respondents had completed agriculture courses while in high school, and less than 20 percent had been members of the FFA organization. Over 40 percent of the respondents had been members of 4-H clubs.

Over 80 percent of the Rural Missouri Adult respondents had experience raising animals or pets, and had also raised plants, gardens, or crops. The primary sources of news for Rural Missouri Adults were newspapers, radio, and television. Nearly half of the respondents also read news magazines regularly.

The Rural Missouri Adult group had the greatest variation among all respondent groups with respect to level of education. Over 13.4 percent of the Rural Missouri Adult respondents had a tenth grade education or less. Nearly half of the respondent group had completed the 11th or 12th grade, and 21.8 percent had completed some college. Slightly over 15 percent had completed the B.S. degree or higher, which was comparable to the Urban Missouri Adult group.

Knowledge of Agriculture

The Rural Missouri Adult group produced a mean knowledge of agriculture score of 24.25 with a standard deviation of 6.72. The mean knowledge of agriculture score was further analyzed by employing stepwise regression and utilizing the demographic characteristics as the pool of predictor variables. The .05 alpha level was established as the criterion for including variables in the prediction equation.

The results of the stepwise regression analysis for the Rural Missouri Adult mean knowledge of agriculture score are presented in Table 13. Eight demographic characteristics

were found to be significant predictors of knowledge of agriculture scores for the Rural Missouri Adult respondent group. Collectively, the eight predictor variables accounted for 63 percent of the total variance in the knowledge of agriculture score.

Table 13

Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Rural Missouri Adult Group

Variable[a]	b	F	p
Home in town/city	-3.86	43.27	.001
Bachelor's degree or higher	5.68	94.95	.001
White race	2.66	32.57	.001
Some college completed	2.89	29.56	.001
Raised plants, gardens, or crops	-2.49	21.13	.001
Relatives on a farm	-1.64	14.36	.001
Population less than 2,500	1.41	6.26	.013
Read newspaper	-1.08	4.01	.046

[a]Variables were coded: No = 0; Yes = 1
Intercept = 29.66 Model R^2 = .63

Four demographic characteristics produced negative regression coefficients. The four characteristics were: (a) home located in a city/town, (b) relatives living or working on a farm, (c) experience in raising plants, gardens, or crops, and (d) reading newspapers as a regular source of news. It was determined that persons who possessed those characteristics produced lower knowledge of agriculture scores than those who did not possess those characteristics.

Four demographic characteristics were identified through regression analysis which produced positive correlation coefficients. Those four characteristics were: (a) completing a bachelors degree or higher, (b) white race, (c) completing some college education, and (d) living in or near a town with a population less than 2,500. Respondents who possessed one or more of those characteristics produced higher knowledge of agriculture scores than those not possessing such characteristics.

Perception of Agriculture

The Rural Missouri Adult group produced a mean perception of agriculture score of 73.97 with a standard deviation of 12.97. The perception of agriculture score was further analyzed using stepwise regression analysis to identify demographic characteristics which accounted for a significant portion of the variance associated with the Rural Missouri Adult group mean score. Five characteristics met the .05 alpha level criterion for inclusion in the prediction equation. Collectively, the five demographic characteristics included in the prediction model accounted for 31 percent of the variance associated with the perception of agriculture score. The results of the regression analysis are presented in Table 14.

Four demographic characteristics produced positive regression coefficients including: (a) home located in a town/city, (b) not living on a farm, (c) having relatives who live or work on a farm, and (d) living in or near a town with a population between 2,500 and 10,000. Respondents who possessed one or more of those four demographic characteristics produced higher (less positive) perception of agriculture scores. One demographic characteristic produced a negative regression coefficient. Respondents who completed an 8th grade education or less produced lower (more positive) perception of agriculture scores.

Table 14

Stepwise Regression Analysis of the Perception of Agriculture Score for the Rural Missouri Adult Group

Variable[a]	b	F	p
Home in town/city	6.02	16.42	.001
Don't live on a farm	7.47	19.48	.001
Relatives on a farm	5.01	18.30	.001
Education less than 8th grade	-9.05	16.85	.001
Population between 2,500 - 10,000	3.67	7.44	.007

[a]Variables were coded: No = 0; Yes = 1
Intercept = 54.79 Model R^2 = .31

Urban Missouri Adult Group

The Urban Missouri Adult group had a higher proportion of male respondents and fewer female respondents than other respondent groups. This respondent group included the greatest variation in racial composition; 43 percent white, 33 percent black, and 16 percent hispanic.

Nearly 92 percent of the group's respondents lived in a town or city. Over 90 percent of the respondents indicated the population of the nearest town/city to be 10,000 or more, with 60 percent reporting a population over 100,000. Less than 2 percent of the Urban Missouri Adult group lived on a farm of greater than 50 acres.

Less than 18 percent of the respondents had relatives who lived or work on a farm, and less than 29 percent had relatives who worked in an agricultural business. Over 35 percent had completed agriculture classes in high school, but less than 7 percent had been

members of the FFA organization. Slightly over 11 percent of the group had been members of a 4-H club.

Two-thirds of the Urban Missouri Adult group had experience raising animals or pets, but slightly over half had experience raising plants, gardens, or crops. Half of the respondents indicated they regularly used magazines as a source of new; 80 percent used newspapers; 85 percent listened to the radio; and 95 percent watched television.

The Urban Missouri Adult respondents had completed more education than the Rural Missouri Adult cohort group. Nearly 23 percent had completed the 11th or 12th grade. Over 57 percent had completed some college and over 15 percent had completed a bachelor's degree or more.

Knowledge of Agriculture

The Urban Missouri Adult group produced a mean knowledge of agriculture score of 24.68 with a standard deviation of 4.49, which was the highest mean and lowest standard deviation among the four respondent groups. Stepwise regression analysis of the group mean knowledge of agriculture score revealed eleven demographic characteristics which were statistically significant predictors. Collectively, the eleven characteristics included in the prediction equation accounted for 42 percent of the variability associated with the group mean knowledge of agriculture score. Results of the stepwise regression analysis are presented in Table 15.

Five demographic characteristics were identified as significant predictors producing negative regression coefficients. The five characteristics were: (a) having relatives living or working on a farm, (b) living in or near a town of less than 2,500, (c) having a home located

in a town or city, (d) hispanic race, and (e) watching television news regularly. Respondents who possessed one or more of those characteristics produced lower knowledge of agriculture scores.

Table 15

Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Urban Missouri Adult Group

Variable[a]	b	F	p
Relatives on a farm	-1.82	9.93	.002
Population less than 2,500	-5.42	51.43	.001
Home in town/city	-2.16	6.71	.010
Gender[b]	2.15	24.78	.001
Bachelor's degree or higher	1.96	13.33	.001
Hispanic race	-1.91	9.68	.002
Population between 10,000 - 25,000	2.34	14.94	.001
Other race	4.62	12.70	.001
Size of farm 10 - 50 acres	2.61	4.61	.033
Watch T.V. news	-2.30	6.23	.013
White race	1.11	5.33	.022

[a]Variables were coded: No = 0; Yes = 1
[b]Gender was coded: Female = 1; Male = 2
Intercept = 28.23 Model R^2 = .42

Six demographic characteristics were identified as significant predictors producing positive regression coefficients. The six characteristics were: (a) male gender, (b) completing a bachelor's degree or higher, (c) living in or near a town with a population between 10,000 and 25,000, (d) "other" race, (e) living on a 10 to 50 acre farm, and (f) white race. Respondents who possessed one or more of those characteristics produced higher knowledge

of agriculture scores.

Perception of Agriculture

The Urban Missouri Adult group produced a mean perception of agriculture score of 77.10 with a standard deviation of 11.71, the second lowest mean score and lowest standard deviation among the four respondent groups. Results of the group perception of agriculture score regression analysis are presented in Table 16.

Eight demographic characteristics were identified as significant predictors of the perception of agriculture score. Collectively, the eight predictors were able to account for 41 percent of the variance associated with the group mean perception of agriculture score. Three demographic characteristics produced negative regression coefficients including: (a) living in a rural area, (b) living in or near a city with a population over 100,000, and (c) living on a farm of 10 to 50 acres. Respondents who possessed one or more of those three characteristics tended to produce lower (more positive) perception of agriculture scores.

Five demographic characteristics produced positive regression coefficients including: (a) living in a town/city with a population between 10,000 and 25,000, (b) living in a town/city with a population less than 2,500, (c) completing the 11th or 12th grade, (d) having experience in raising plants, gardens, or crops, and (e) having relatives who work in an agricultural business. Respondents possessing one or more of those five demographic characteristics tended to produce higher (less positive) perception of agriculture scores.

Table 16

Stepwise Regression Analysis of the Perception of Agriculture Score for the Urban Missouri Adult Group

Variable[a]	b	F	p
Population between 10,000 - 25,000	14.71	47.61	.001
Population less than 2,500	10.71	24.23	.001
Completed 11th or 12th grade	5.35	13.77	.001
Home in a rural area	-4.15	3.23	.073
Raised plants, gardens, or crops	4.71	12.93	.001
Population over 100,000	-5.37	11.68	.001
Relatives in an agribusiness	3.49	7.58	.006
Size of farm 10 - 50 acres	-7.68	6.27	.013

[a]Variables were coded: No = 0; Yes = 1
Intercept = 63.09 Model R^2 = .41

MAJOR FINDINGS

1. Adults were more knowledgeable and had more positive perceptions of agriculture than high school students.
2. Respondents were most knowledgeable about the Natural Resources concept and were least knowledgeable about the Agricultural Policy and Plants in Agriculture concepts.
3. Respondents were most positive about the Natural Resources concept and were the least positive about the Agricultural Policy concept.
4. White respondents were more knowledgeable about Agricultural Literacy concepts than black respondents.
5. There was no difference among the ethnic groups' perceptions of agriculture.
6. Respondents living on farms were more knowledgeable about agriculture than their rural non-farm neighbors, who were more knowledgeable than their urban counterparts.
7. Respondents living on farms had more positive perceptions of agriculture than those living in rural or urban areas.
8. Respondents from larger farms were more knowledgeable about agriculture and had more positive perceptions of agriculture than respondents from smaller farms or not from a farm.
9. Respondents with higher levels of education were more knowledgeable about agriculture than those with less education.
10. Respondents who were more knowledgeable of agriculture also had more positive perceptions of agriculture.
11. Respondents from smaller cities and towns were more knowledgeable about agriculture

than those from larger cities.

12. The Urban Missouri Adults group was the most knowledgeable about agriculture and the Michigan High School group was the least knowledgeable about agriculture.

13. Each respondent group had relatively positive perceptions of agriculture.

14. There was no difference in the agricultural knowledge levels of adults from rural Missouri than those from urban Missouri.

DISCUSSION AND RECOMMENDATIONS

Agricultural Literacy is a concept founded on the premise that citizens of the United States should possess a basic understanding of the industry of agriculture. This study provides evidence of the need to further educate the general public regarding the industry which produces and markets the food needed to sustain human life.

It is important to note that none of the groups which provided data collected in this study were totally "ignorant" of the food and agriculture industry. However, when examining the level of knowledge possessed by respondents, it is important to recognize that 15 percent of all the responses revealed that the respondent "didn't know" the answers to basic questions about agriculture. In addition, slightly over 20 percent of all responses were incorrect. Therefore, when these two response categories were combined, over one-third of the responses were not considered to be correct.

Conversely, two-thirds of the responses to the knowledge questions were correct. Therefore, one might conclude that the general public possesses a basic level of knowledge about the industry of agriculture. However, on a traditional academic achievement basis, the score of 63 percent would result in a "D" grade. This result would be considered less than a satisfactory measure of achievement in most educational settings.

The Natural Resources concept area produced the highest knowledge score by three respondent groups. The Indiana High School, Michigan High School, and Rural Missouri Adult groups produced the highest knowledge scores for the Natural Resources concept area. Interestingly, the Urban Missouri Adult group produced the lowest knowledge score for the Natural Resources concept. The highest knowledge score for the Urban Missouri Adult group

was for the Animals in Agriculture concept area.

Relatively low knowledge concept means were produced in the areas of Plants in Agriculture, Agricultural Policy, and Agricultural Processing. These areas appear to be target areas for future educational efforts to enhance the knowledge and understanding of U.S. citizens. However, there is sufficient room for improvement in the knowledge levels of each of the seven concept areas included in this study.

In general, the perceptions of each of the four respondent groups regarding agriculture were relatively positive. The concept areas which received the most positive responses included Natural Resources and Plants in Agriculture. The Agricultural Policy concept area produced the least positive perception of agriculture score; however, the mean concept score was in the "positive" range of the scale.

When analyzed by ethnic background of respondents, an interesting trend emerged. Generally, white respondents produced the highest knowledge scores and black respondents produced the lowest knowledge scores. However, when analyzing the Perception of Agriculture scores, there were no differences in the responses when classified by ethnic group. Therefore, it appears that there may be a differential relationship between the knowledge levels and the perception of agriculture among the different ethnic groups. Further research is needed to more adequately explain this phenomenon.

Respondents who lived on farms were found to have greater Knowledge of Agriculture than rural residents or urban residents. This finding provides empirical evidence for a logical hypothesis. In general, the closer respondents resided to areas of production agriculture, the more knowledgeable they were about the industry of agriculture. Further evidence of this observation was provided as a result of finding that respondents who lived in or nearer to

smaller population towns or cities were more knowledgeable about agriculture. Conversely, respondents who lived in or near larger cities tended to be less knowledgeable about agriculture.

Respondent Knowledge of Agriculture scores were also found to be a function of education level. Respondents with higher levels of education also tended to produce higher Knowledge of Agriculture scores. Therefore, it was concluded that educational institutions have contributed to the knowledge base of students by providing instruction about the industry of agriculture. Although this conclusion may be logical, it is not sufficient. Additional emphasis should be directed toward instructional programs in elementary and secondary schools to enhance the knowledge levels of all citizens regarding agriculture, food, and natural resources.

Educational institutions have a philosophical obligation to provide instruction which prepares students for success in life. Enhancing the knowledge and perceptions of students about agriculture should be a major curricular thrust of the educational programming in the nation's schools. Failure to educate current and future generations of citizens about agriculture, food, and natural resources may place the future viability of those economic sectors in jeopardy. Therefore, responsibility for Agricultural Literacy education should not rest solely on agricultural educators. The entire scope and sequence of elementary and secondary education should embrace the goal of Agricultural Literacy education through an integrative approach throughout the curriculum. Agricultural literacy is too important to be limited to the efforts of any single teacher or instructional program.

Respondents who produced higher Knowledge of Agriculture scores were also found to have more positive perceptions of agriculture, food, and natural resources. Conversely,

respondents with less knowledge about agriculture were less positive about agriculture, food, and natural resources. These observations provide additional evidence for the need to enhance the knowledge level of U.S. citizens regarding agricultural literacy concepts. Such a recommendation is based on the assumption that individual perceptions of agriculture, food, and natural resources can be positively influenced through educational programs and activities which are designed to enhance the knowledge level of participants.

Respondents from smaller cities and towns were found to be more knowledgeable than their counterparts from larger population centers. This finding may be a function of the environment in which individuals live and work. Persons from smaller communities and rural areas would be more likely to interact with farmers and other individuals working in agricultural businesses. Conversely, persons who reside in larger cities and metropolitan areas would expectedly have fewer opportunities to interact with farmers and individuals employed in agricultural businesses. Therefore, educational programs should be provided in larger population centers to meet the educational needs of those residents regarding agriculture, food, and natural resources.

Overall, the four respondent groups revealed they possessed some knowledge of agriculture, food, and natural resources. However, the level of knowledge was judged to be less than what might be necessary to be considered "agriculturally literate." Specific emphasis should be directed toward inner city minority students who have had limited exposure to agricultural literacy concepts. Those students appeared to have a greater need for supplemental instruction about agriculture, food, and natural resources than did their white counterparts from high schools in Indiana. Although minority high school students from Michigan appeared to have the greatest need for agricultural literacy instruction, each of the

other groups would have benefitted from such instruction as well. Educational programs should be developed for secondary students as well as adults to enhance their level of agricultural literacy.

Although group differences were identified for the Perception of Agriculture variable, each group produced positive perception scores. Therefore, it was concluded that although the respondent groups in this study had a limited knowledge of agriculture, their perception of the industry was somewhat positive. It might also be concluded that more positive perceptions might result if the agricultural literacy knowledge level of U.S. citizens were to be enhanced. Recognizing the relationship between agricultural knowledge and perceptions, it is hypothesized that programs directed toward the 30 plus percent of the knowledge responses which were "incorrect" or "don't know" would result in an even more positive perception of agriculture. Therefore, it is recommended that the USDA investigate the possibility of implementing a national initiative directed toward enhancing the agricultural knowledge of all citizens.

It is further recommended that the USDA develop a National Center for Agricultural Literacy (NCAL), with the specific mission of initiating educational programs to elevate the agricultural knowledge level of U.S. citizens. The NCAL should be charged with the responsibility for providing resource support and program models which could be adapted for use in each state. Objectives of the NCAL should be to:

1. Produce and disseminate instructional materials designed to enhance the teaching of and learning about agriculture in our nations schools.
2. Assist state departments of education and agriculture to work cooperatively with agriculturally related organizations and businesses to promote agricultural

literacy among all citizens.

3. Monitor and report the levels of agricultural literacy of representative segments of the U.S. population.
4. Respond to current issues affecting agriculture by providing relevant and credible information to the media.
5. Serve as a clearinghouse for resource materials which could be used by classroom teachers to enhance the agricultural literacy of students.

Teachers in elementary and secondary schools should be encouraged to develop a greater understanding of the importance and significance of agriculture in this country and the world. Instructional assistance should be provided through pre-service and inservice programs which would facilitate the use of agricultural examples in elementary and secondary school classes. In addition, college students (especially those attending land grant institutions) should develop a greater awareness and appreciation for agriculture as part of their undergraduate degree program. General education components of all undergraduate degree programs should be examined to identify opportunities to infuse agricultural literacy instruction. Graduates of higher education institutions in this country should not be considered to have received a "well-rounded education" if they lack an understanding and appreciation of the significance of agriculture in their daily lives.

The most immediate need is to elevate the awareness of the agricultural literacy issue throughout the United States. One strategy to direct attention toward the issue would be to plan and conduct a National Conference on Agricultural Literacy. Target groups that should be involved in the conference include:

-USDA

-State Departments of Agriculture

-State Departments of Education

-College of Agriculture Deans

-College of Education Deans

-College of Liberal Arts Deans

-General Farm Organizations

-Commodity Organizations

-Legislators

-Faculty in Colleges of Agriculture, Education, and Liberal Arts

-Agribusiness/Industry Leaders

The program for a National Conference on Agricultural Literacy should be planned to: (a) enhance the awareness of the agricultural literacy issue, (b) motivate individuals and groups into action to address the agricultural literacy issue, and (c) provide an opportunity to promote strategies which have proven successful in promoting agricultural literacy.

SUMMARY

The level of agricultural literacy possessed by respondents in this study should be improved. Future generations of citizens will be further removed (both physically and cognitively) from agriculture. Without intervention additional distance between citizens and agricultural producers will further reduce the level of agricultural literacy. Therefore, steps should be taken to enhance the agricultural literacy of adults and students in this country. Mobilization of individuals and groups in each state should be initiated through a National Conference on Agricultural Literacy in order to direct national attention toward the issue. A National Center for Agricultural Literacy should also be created to guide and direct a national effort to enhance public awareness of agriculture.

This nation has a rich heritage in agriculture. Future generations depend heavily on the ability of the agriculture industry to produce food, clothing, and raw materials for shelter, and industrial applications. Therefore, a national effort to enhance agricultural literacy in this country should be a priority. Failure to educate the American public about the production and marketing of agricultural products may place the industry in jeopardy. The security of the industry will be directly influenced by policies developed by groups and individuals with limited agricultural knowledge and experience. Therefore, it is imperative that every citizen develop a basic understanding of and appreciation for the industry of agriculture. To do less would place unnecessary risk on the industry which is so vital to our future well-being.

REFERENCES

Adkisson, P.L. (1990). Warning: Eating may be harmful to your health. William Henry Hatch Memorial Lecture, Presented at the Annual Meeting of the National Association of State Universities and Land Grant Colleges, Kansas City, MO.

Birkenholz, R. J., et. al. (1992). Strategies to promote agricultural literacy. Report presented to the American Association for Agricultural Education by The Agricultural Literacy Work Group, St. Louis, Missouri.

Birkenholz, R. J. (1990). Expanding our mission in presecondary agriculture. The Agricultural Education Magazine, 63(1), 12-13.

Farm Foundation. (1989, April). High school student perceptions of agricultural college majors and careers. (Executive Summary). Oak Brook, IL.

Frick, M. J. (1991). A definition and the concepts of agricultural literacy: A national study (Doctoral dissertation, Iowa State University, 1990). Dissertation Abstracts International, 51. 2244A.

Hamlin, H. M. (1962). Public school and education in agriculture. Danville, IL: Interstate.

Law, D. A. & Pepple, J. (1990). A state plan for agricultural education. The Agricultural Education Magazine, 62(8), 10-12.

Mawby, R. G. (1984). Agriculture colleges must take the lead in ending ignorance about farming. The Chronicle of Higher Education, 28(11), 72.

Mayer, A. & Mayer, J. (1974). Agriculture: The island empire. Daedalus, 103(3), 83-95.

National Research Council, Board on Agriculture, Committee on Agricultural Education in Secondary Education. (1988). Understanding Agriculture: New Directions for Education. Washington, D.C.: National Academy Press.

Nipp, T.L. (1988). Congress and the future of agricultural research, extension, and education. Journal of Agricultural Production, 1(3), 187-190.

Russell, E.E. McCracken, J.D., & Miller, W. W. (1990, March). Position statement on agricultural literacy. The Agricultural Education Magazine, 62(9), 13-14.

APPENDIX A
Knowledge Statement Responses by Group

Table 17

Percentage of Indiana High School Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly

Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Significance of agriculture:			
There are more farmers in the U.S. than there were 10 years ago.	79.8	14.2	6.0
U.S. research has improved farming methods in other countries.	70.7	11.7	17.6
Thousands of people in the world die of starvation each year.	91.8	5.7	2.4
The average U.S. farm is larger than 500 acres.	38.3	35.9	25.7
Several countries depend on U.S. agricultural exports for food and fiber.	80.2	8.4	11.3
Concept Average	72.2	15.2	12.6
Agricultural policy:			
Less than three percent of the U.S. gross national product is from agriculture.	44.7	32.4	22.9
One of every five jobs in the U.S. is related to agriculture.	38.7	35.5	25.8
Local laws and regulations have little effect on farmers.	80.2	9.3	10.5
U.S. agricultural policies influence food prices in other countries.	68.0	14.6	17.5
Government subsidy payments to farmers are used to stabilize food prices.	51.4	21.4	27.1
Concept Average	56.6	22.6	20.8
Natural resources/environment:			
Soil erosion does not pollute U.S. lakes and rivers.	78.1	14.8	7.0
Many farmers use tillage practices that conserve the soil.	61.3	14.1	24.6
Farming and wildlife cannot survive in the same geographic area.	67.9	22.1	10.1
Animal wastes are used to increase soil fertility.	92.2	2.8	4.8
Water, soil, and minerals are important in agriculture.	94.7	3.9	1.2
Concept Average	78.8	11.5	9.5

Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Plants in agriculture:			
The use of pesticides has increased the yields of crops.	72.7	13.8	13.5
Plant products are the main source of human foods.	59.4	30.0	10.6
Biotechnology has increased the pest resistance of plants.	61.2	10.2	28.6
Profits increase as farmers strive for maximum crop yields.	27.9	53.8	18.3
Very little of the grain produced in the U.S. is exported.	56.5	19.5	23.8
Concept Average	55.5	25.5	19.0
Animal agriculture:			
Animal health and nutrition are important to farmers.	89.8	5.5	4.6
Animals can be a valuable source of medical products.	55.1	18.3	26.6
Animals eat foodstuffs that cannot be digested by humans.	52.5	19.9	27.5
Biotechnology has increased animal production in the U.S.	41.1	24.7	34.0
Hamburger is made from the meat of pigs.	87.7	7.9	4.2
Concept Average	65.2	13.8	19.4
Agricultural processing:			
Food safety is a major concern of the food processing industry.	84.4	9.9	5.7
Homogenization kills bacteria in milk with heat.	27.1	56.1	16.6
New products have been developed using surplus grains.	61.5	7.5	31.0
Pasteurization kills bacteria in milk with heat.	56.8	26.1	17.1
Using grain alcohol for fuel reduces the U.S. dependence on foreign oil.	59.8	15.4	24.7
Concept Average	57.9	23.0	19.0
Marketing and distribution:			
Processing increases the cost of food products.	69.8	13.7	16.5
The U.S. does <u>not</u> sell its feed grains on the world market.	71.7	7.6	20.7
Grain exports are usually transported between continents by airplane.	41.6	34.9	23.5
An efficient food distribution system is essential to the agricultural industry.	76.0	10.1	13.8
Transportation and storage affect the supply of agricultural products.	75.4	10.4	14.3
Concept Average	66.9	15.3	17.8
Overall Knowledge Total	64.7	18.1	16.9

Table 18

Percentage of Michigan High School Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly

Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Significance of agriculture:			
There are more farmers in the U.S. than there were 10 years ago.	44.5	22.8	32.7
U.S. research has improved farming methods in other countries.	41.3	25.0	33.7
Thousands of people in the world die of starvation each year.	77.5	15.4	6.5
The average U.S. farm is larger than 500 acres.	26.2	30.7	42.6
Several countries depend on U.S. agricultural exports for food and fiber.	57.8	20.4	21.3
Concept Average	49.5	22.9	27.4
Agricultural policy:			
Less than three percent of the U.S. gross national product is from agriculture.	39.8	22.0	38.2
One of every five jobs in the U.S. is related to agriculture.	34.2	30.4	35.3
Local laws and regulations have little effect on farmers.	45.2	22.4	32.0
U.S. agricultural policies influence food prices in other countries.	44.2	20.0	34.5
Government subsidy payments to farmers are used to stabilize food prices.	38.7	21.3	38.7
Concept Average	40.4	23.2	35.7
Natural resources/environment:			
Soil erosion does not pollute U.S. lakes and rivers.	55.9	22.2	21.3
Many farmers use tillage practices that conserve the soil.	39.8	19.0	41.2
Farming and wildlife cannot survive in the same geographic area.	39.1	34.7	25.7
Animal wastes are used to increase soil fertility.	65.5	13.7	20.6
Water, soil, and minerals are important in agriculture.	82.9	7.0	9.2
Concept Average	56.6	19.4	23.6

Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Plants in agriculture:			
The use of pesticides has increased the yields of crops.	40.3	32.3	27.2
Plant products are the main source of human foods.	62.5	22.3	15.2
Biotechnology has increased the pest resistance of plants.	45.2	14.8	40.0
Profits increase as farmers strive for maximum crop yields.	24.6	45.9	29.1
Very little of the grain produced in the U.S. is exported.	39.9	22.9	36.5
Concept Average	42.5	27.6	29.6
Animal agriculture:			
Animal health and nutrition are important to farmers.	86.2	7.3	6.2
Animals can be a valuable source of medical products.	40.4	27.0	32.4
Animals eat foodstuffs that cannot be digested by humans.	43.1	43.6	12.6
Biotechnology has increased animal production in the U.S.	33.2	26.2	39.9
Hamburger is made from the meat of pigs.	56.6	27.6	13.7
Concept Average	51.9	26.3	21.0
Agricultural processing:			
Food safety is a major concern of the food processing industry.	68.5	20.8	10.6
Homogenization kills bacteria in milk with heat.	20.0	54.4	25.4
New products have been developed using surplus grains.	39.5	15.1	45.1
Pasteurization kills bacteria in milk with heat.	51.5	23.5	24.4
Using grain alcohol for fuel reduces the U.S. dependence on foreign oil.	26.1	27.6	43.9
Concept Average	41.1	28.3	29.9
Marketing and distribution:			
Processing increases the cost of food products.	56.5	20.5	23.0
The U.S. does <u>not</u> sell its feed grains on the world market.	40.1	19.5	40.1
Grain exports are usually transported between continents by airplane.	14.3	55.4	29.6
An efficient food distribution system is essential to the agricultural industry.	58.0	16.0	25.6
Transportation and storage affect the supply of agricultural products.	52.4	17.3	28.7
Concept Average	44.3	25.7	29.4
Overall Knowledge Total	46.6	24.8	28.1

Table 19

Percentage of Rural Missouri Adult Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly

Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Significance of agriculture:			
There are more farmers in the U.S. than there were 10 years ago.	61.2	32.5	6.1
U.S. research has improved farming methods in other countries.	79.9	13.1	7.1
Thousands of people in the world die of starvation each year.	89.0	8.8	2.0
The average U.S. farm is larger than 500 acres.	42.9	42.9	14.3
Several countries depend on U.S. agricultural exports for food and fiber.	77.3	14.5	7.9
Concept Average	70.1	22.4	7.5
Agricultural policy:			
Less than three percent of the U.S. gross national product is from agriculture.	44.1	40.1	15.6
One of every five jobs in the U.S. is related to agriculture.	57.9	30.8	11.0
Local laws and regulations have little effect on farmers.	62.4	27.0	10.5
U.S. agricultural policies influence food prices in other countries.	73.0	21.5	5.3
Government subsidy payments to farmers are used to stabilize food prices.	55.8	34.2	9.9
Concept Average	58.6	30.7	10.5
Natural resources/environment:			
Soil erosion does not pollute U.S. lakes and rivers.	68.9	26.0	5.1
Many farmers use tillage practices that conserve the soil.	79.7	12.6	7.7
Farming and wildlife cannot survive in the same geographic area.	71.9	24.3	3.5
Animal wastes are used to increase soil fertility.	80.4	13.8	5.7
Water, soil, and minerals are important in agriculture.	88.6	9.2	2.0
Concept Average	77.9	17.2	4.8

Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Plants in agriculture:			
The use of pesticides has increased the yields of crops.	68.7	18.9	12.1
Plant products are the main source of human foods.	77.3	17.6	4.9
Biotechnology has increased the pest resistance of plants.	62.4	20.4	17.1
Profits increase as farmers strive for maximum crop yields.	39.3	49.2	11.3
Very little of the grain produced in the U.S. is exported.	62.7	30.9	6.2
Concept Average	62.1	27.4	10.3
Animal agriculture:			
Animal health and nutrition are important to farmers.	83.7	11.9	4.4
Animals can be a valuable source of medical products.	70.4	22.5	6.8
Animals eat foodstuffs that cannot be digested by humans.	72.1	23.9	3.8
Biotechnology has increased animal production in the U.S.	66.2	18.0	15.8
Hamburger is made from the meat of pigs.	93.8	4.6	1.5
Concept Average	77.2	16.2	6.5
Agricultural processing:			
Food safety is a major concern of the food processing industry.	78.0	16.3	5.5
Homogenization kills bacteria in milk with heat.	35.6	57.5	6.9
New products have been developed using surplus grains.	72.0	14.3	13.7
Pasteurization kills bacteria in milk with heat.	77.9	17.0	4.9
Using grain alcohol for fuel reduces the U.S. dependence on foreign oil.	66.9	25.0	7.9
Concept Average	66.1	26.0	7.8
Marketing and distribution:			
Processing increases the cost of food products.	82.5	12.6	4.7
The U.S. does <u>not</u> sell its feed grains on the world market.	74.3	19.3	6.1
Grain exports are usually transported between continents by airplane.	55.0	38.6	6.1
An efficient food distribution system is essential to the agricultural industry.	74.0	15.2	10.6
Transportation and storage affect the supply of agricultural products.	78.7	15.4	5.7
Concept Average	72.9	20.2	6.6
Overall Knowledge Total	69.3	22.9	7.7

Table 20

Percentage of Urban Missouri Adult Respondents Answering Agricultural Knowledge Statements Correctly and Incorrectly

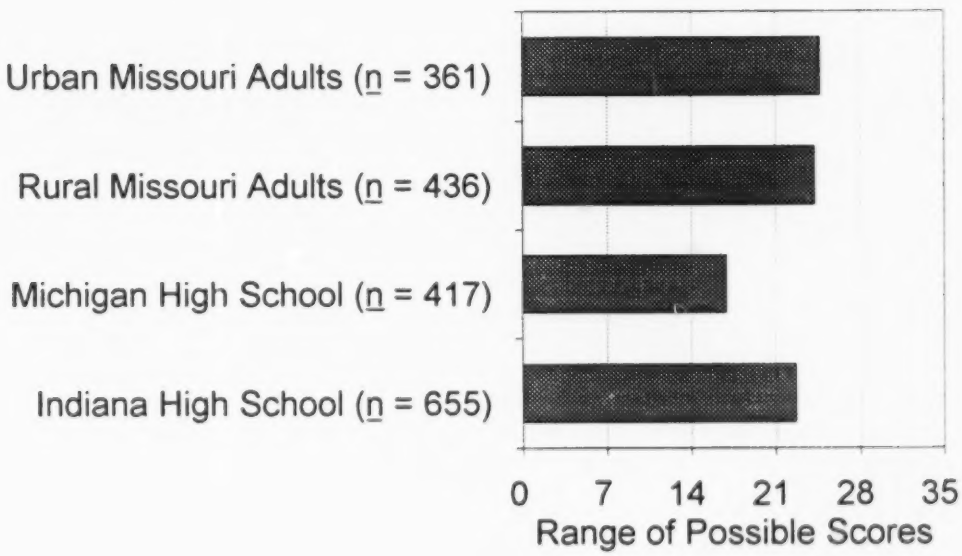
Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Significance of agriculture:			
There are more farmers in the U.S. than there were 10 years ago.	54.1	40.2	5.4
U.S. research has improved farming methods in other countries.	77.2	9.4	13.5
Thousands of people in the world die of starvation each year.	88.8	6.9	4.3
The average U.S. farm is larger than 500 acres.	51.8	29.3	18.9
Several countries depend on U.S. agricultural exports for food and fiber.	69.0	18.2	12.8
Concept Average	68.2	20.8	11.0
Agricultural policy:			
Less than three percent of the U.S. gross national product is from agriculture.	59.7	25.9	14.4
One of every five jobs in the U.S. is related to agriculture.	60.2	24.1	15.7
Local laws and regulations have little effect on farmers.	55.1	39.4	5.5
U.S. agricultural policies influence food prices in other countries.	85.6	6.6	7.8
Government subsidy payments to farmers are used to stabilize food prices.	77.3	14.4	8.3
Concept Average	67.6	22.1	10.3
Natural resources/environment:			
Soil erosion does not pollute U.S. lakes and rivers.	44.9	45.9	9.3
Many farmers use tillage practices that conserve the soil.	68.7	10.5	20.8
Farming and wildlife cannot survive in the same geographic area.	41.0	55.9	3.1
Animal wastes are used to increase soil fertility.	83.6	13.6	2.8
Water, soil, and minerals are important in agriculture.	91.0	8.2	0.2
Concept Average	65.8	26.8	7.2

Concept Area: Statement	% Correct	% Incorrect	% Don't Know
Plants in agriculture:			
The use of pesticides has increased the yields of crops.	71.5	25.8	2.7
Plant products are the main source of human foods.	85.6	9.1	5.3
Biotechnology has increased the pest resistance of plants.	81.9	8.1	10.0
Profits increase as farmers strive for maximum crop yields.	24.2	68.5	7.3
Very little of the grain produced in the U.S. is exported.	46.4	40.0	12.0
Concept Average	61.9	30.3	7.5
Animal agriculture:			
Animal health and nutrition are important to farmers.	92.9	4.6	2.4
Animals can be a valuable source of medical products.	75.4	14.9	9.8
Animals eat foodstuffs that cannot be digested by humans.	71.0	24.5	4.5
Biotechnology has increased animal production in the U.S.	83.8	9.4	6.8
Hamburger is made from the meat of pigs.	79.2	11.2	8.9
Concept Average	80.5	12.9	6.5
Agricultural processing:			
Food safety is a major concern of the food processing industry.	86.4	11.1	2.4
Homogenization kills bacteria in milk with heat.	25.4	69.8	4.8
New products have been developed using surplus grains.	82.1	9.5	8.3
Pasteurization kills bacteria in milk with heat.	83.9	10.6	5.4
Using grain alcohol for fuel reduces the U.S. dependence on foreign oil.	81.8	11.4	6.8
Concept Average	71.9	22.5	5.5
Marketing and distribution:			
Processing increases the cost of food products.	88.9	6.3	4.8
The U.S. does <u>not</u> sell its feed grains on the world market.	55.7	36.0	8.3
Grain exports are usually transported between continents by airplane.	48.7	42.3	9.0
An efficient food distribution system is essential to the agricultural industry.	87.0	9.2	3.8
Transportation and storage affect the supply of agricultural products.	86.8	5.1	8.1
Concept Average	73.4	16.8	6.8
Overall Knowledge Total	69.9	21.7	7.8

APPENDIX B
Data Charts

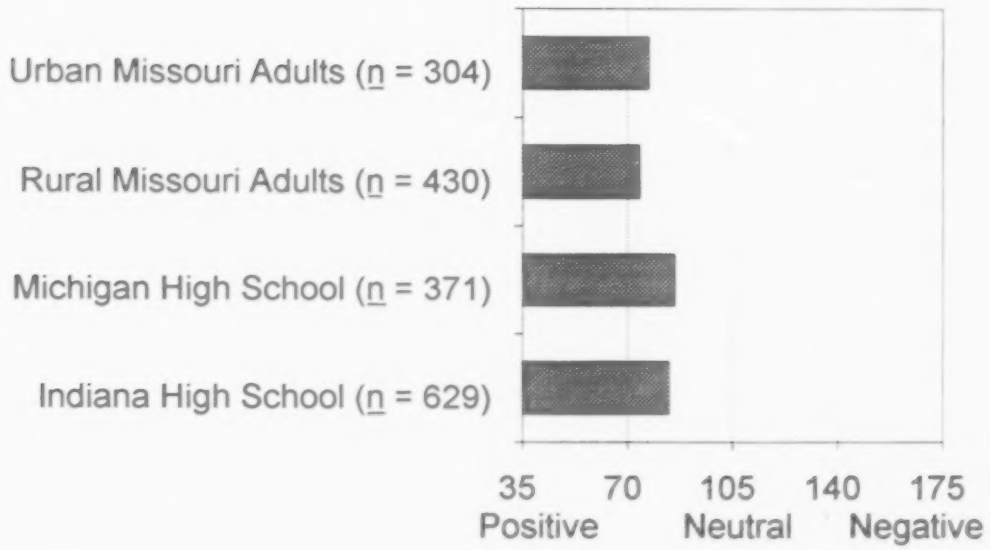
Knowledge of Agriculture

Comparison of Group Means



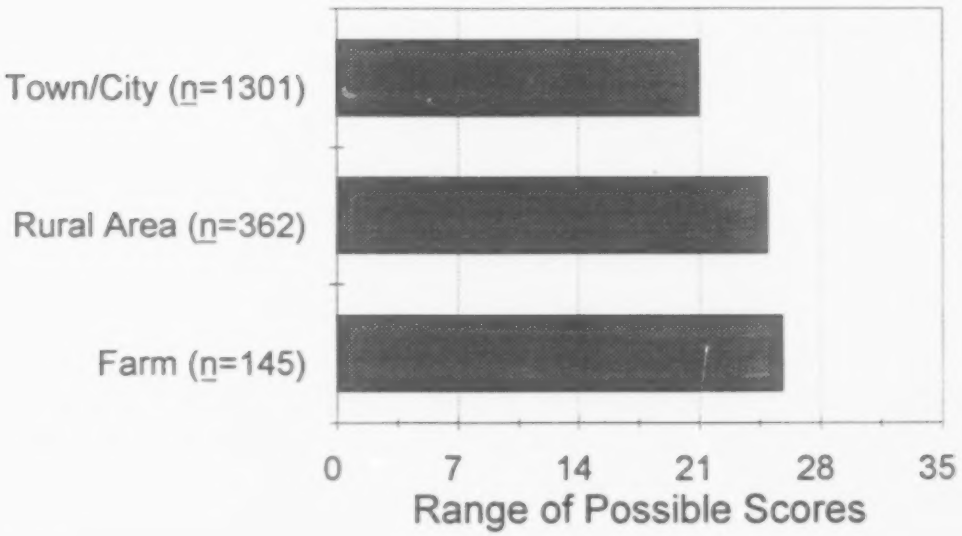
Perception of Agriculture

Comparison of Group Means



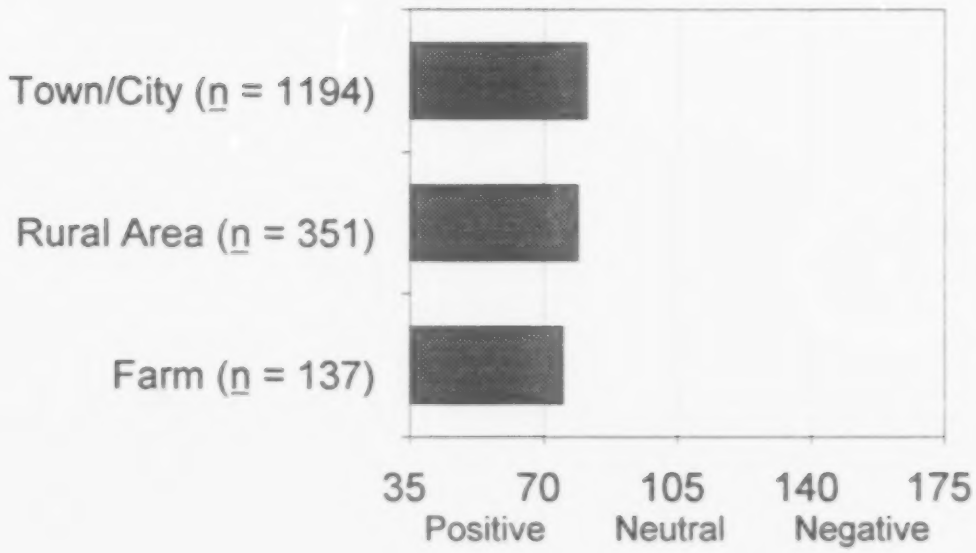
Overall Knowledge of Agriculture

Means by Home Location



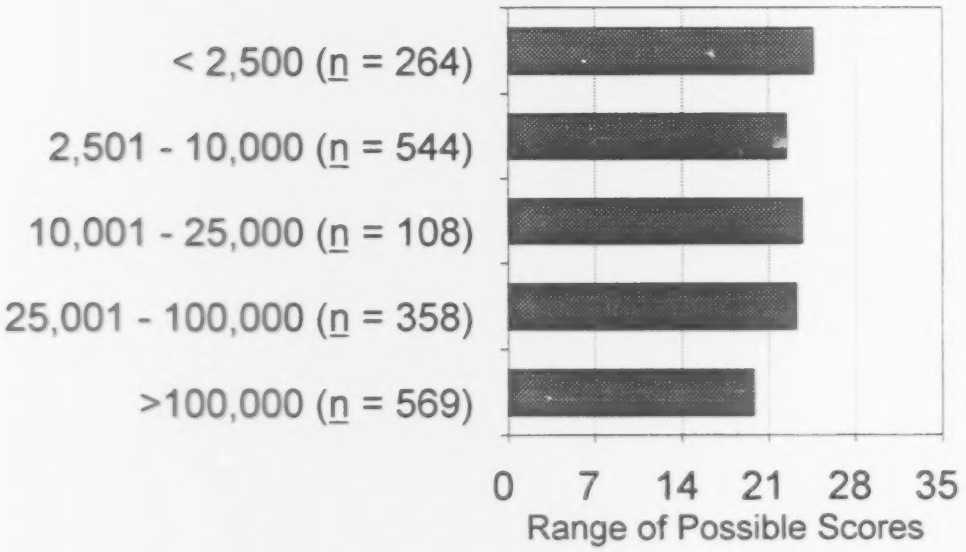
Overall Perception of Agriculture

Means by Home Location



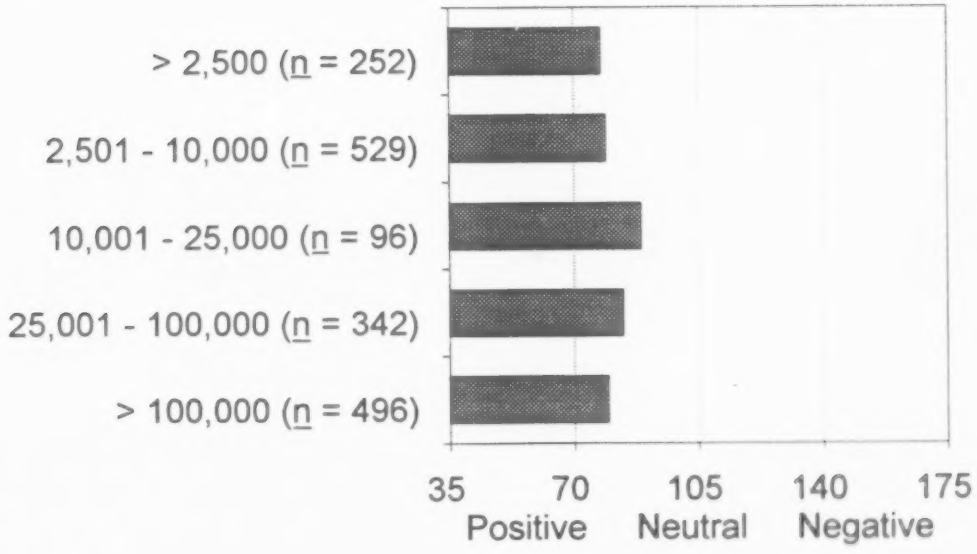
Overall Knowledge of Agriculture

Means by Population



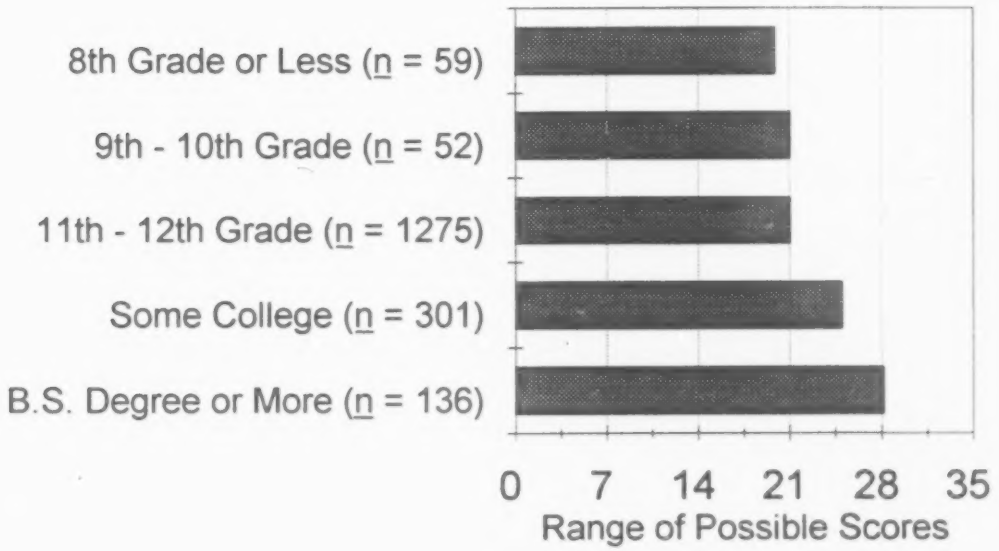
Overall Perception of Agriculture

Means by Population



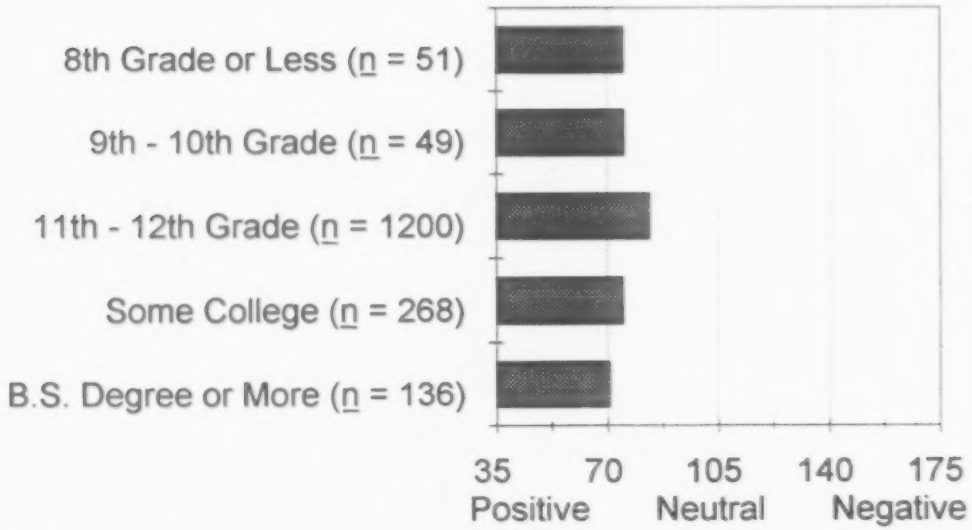
Overall Knowledge of Agriculture

Means by Education Level



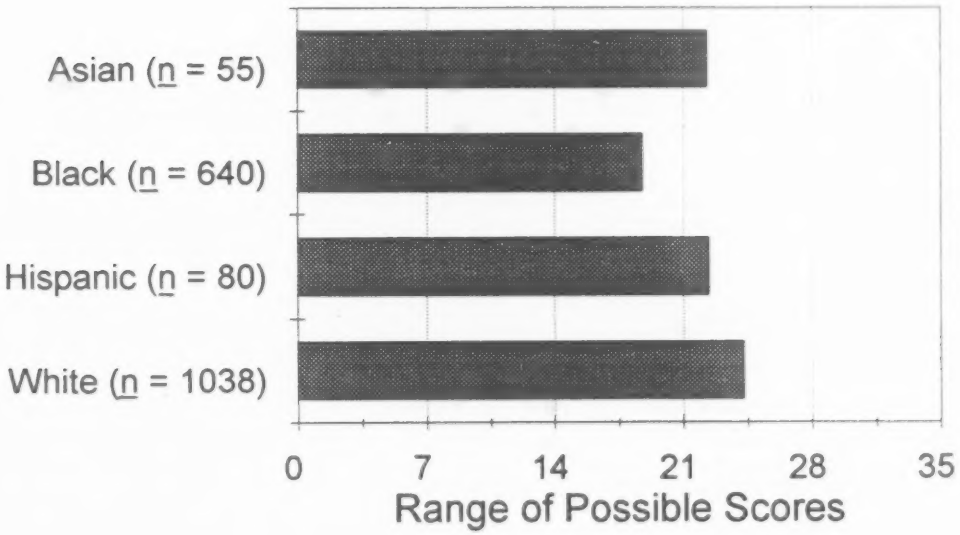
Overall Perception of Agriculture

Means by Education Level



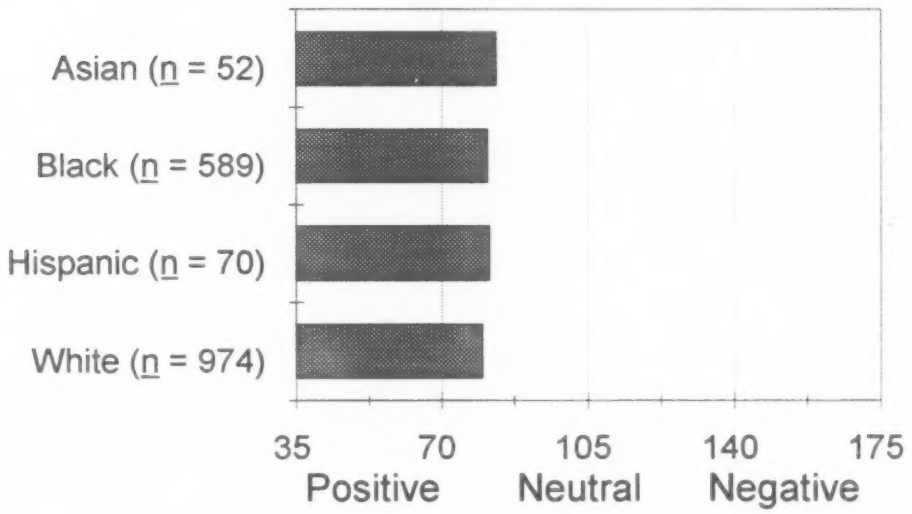
Overall Knowledge of Agriculture

Means by Race



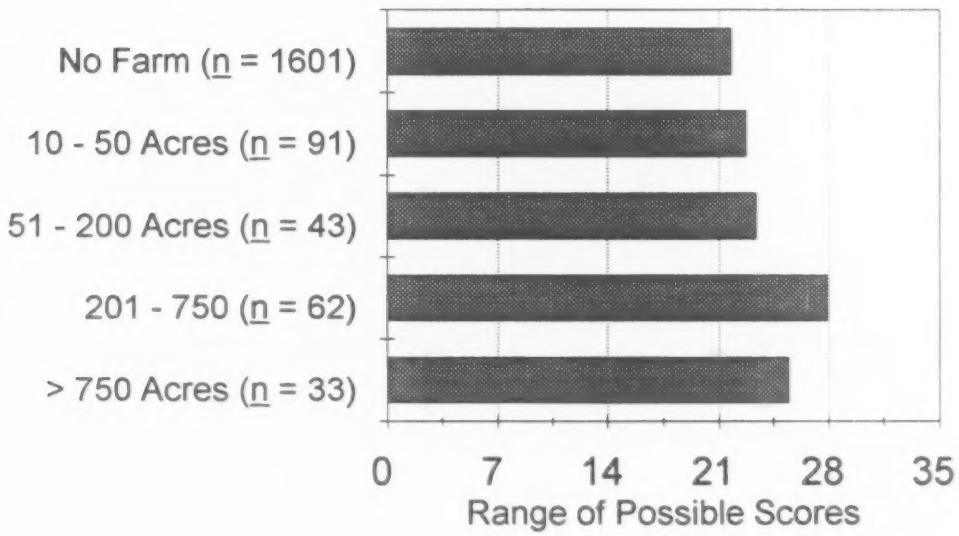
Overall Perception of Agriculture

Means by Race



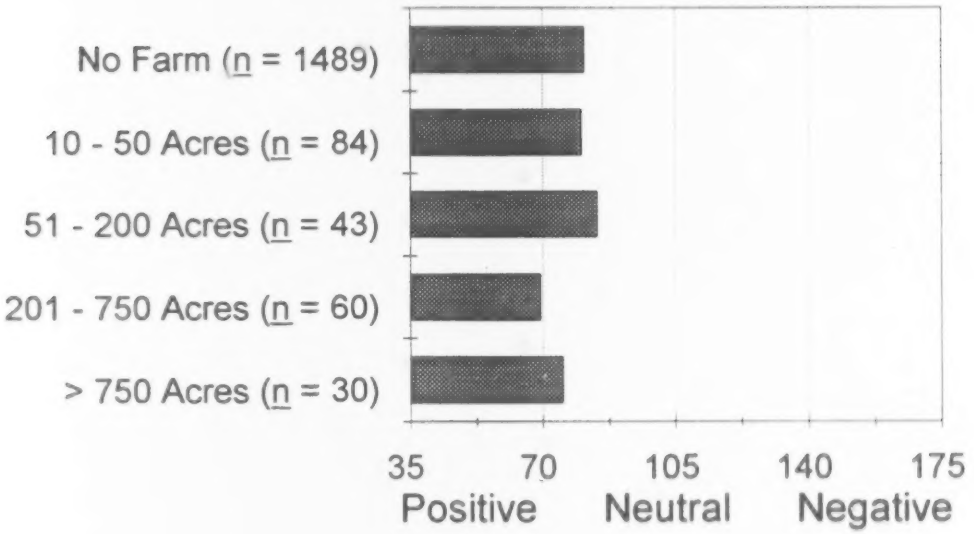
Overall Knowledge of Agriculture

Means by Size of Farm



Overall Perception of Agriculture

Means by Size of Farm



APPENDIX C
Data Collection Instrument

A cooperative project of :

University of Missouri

Lincoln University

Michigan State University

Purdue University

This survey is comprised of three sections. Section I relates to general information about agriculture, food, and food production. Section II relates to your general perceptions of agriculture, food, and food production. Section III requests demographic information about respondents.

Responses to the survey will be kept confidential and should be recorded on the computer answer sheet provided. Use a #2 lead pencil to darken the circle corresponding to your response to each statement. After completing each of the three sections, please return the answer sheet and survey form.

(Note: If you need to change one of your answers, erase the first mark completely from the answer sheet before filling in the new answer.)

On side two of the Answer Sheet indicate your Birth Date (both year and month) in the lower left corner.

Section I

Directions: Read each statement and mark "A" if you think the statement is TRUE or mark "B" if you think the statement is FALSE. If you DON'T KNOW whether the statement is true or false, the mark "C" on the answer sheet.

	True	False	Don't Know		
Example:					
U.S. farms are smaller than those in Europe.	○	●	○	○	○

If you think the statement is FALSE, then fill in the blank under the letter "B".

Statements

1. There are more farmers in the U.S. than there were 10 years ago.
2. Less than 3 percent of the U.S. gross national product is from agriculture.
3. One of every five jobs in the U.S. is related to agriculture.
4. U.S. research has improved farming methods in other countries.
5. Many people in the world die of starvation each year.

6. Soil erosion does not pollute U.S. lakes and rivers.
7. Many farmers use tillage practices that conserve the soil.
8. Farming and wildlife cannot survive in the same area.
9. The use of pesticides has increased the yield of crops.
10. Plant products are the main source of human foods.

11. Biotechnology has increased plant pest resistance.
12. Animal health and nutrition are important to farmers.
13. Animals can be a valuable source of medical products.
14. Animals eat foods which cannot be eaten by humans.
15. Food safety is a major concern of the food processing industry.

16. Homogenization kills bacteria in milk with heat.
17. Processing increases the cost of food products.
18. The average U.S. farm is larger than 500 acres.
19. Local public policies have little effect on farmers.
20. U.S. agricultural policies influence food prices in other countries.

21. Government subsidy payments to farmers are used to stabilize food prices.
22. Many countries depend on agricultural products from the U.S.
23. Animal wastes are used to increase soil fertility.
24. Water, soil, and minerals are important in agriculture.
25. Profits increase as farmers strive for the highest crop yields.

26. Very little of the grain produced in the U.S. is exported.
27. Biotechnology has increased animal production in the U.S.
28. Hamburger is made from the meat of pigs.
29. New products have been developed using surplus grains.
30. Processing greatly adds to the cost of food.

31. Using grain alcohol for fuel reduces the U.S. dependence on foreign oil.
32. The U.S. does <u>not</u> sell its feed grains on the world market.
33. Grain exports are transported between continents by airplane.
34. An efficient food distribution system is essential to the agricultural industry.
35. Transportation and storage affects the supply of agricultural products.

(continued on next page)

Section II

Directions: **Read each statement completely. Darken the circle under the letter which corresponds to your response to each statement on the answer sheet provided. Use one of the following letters to represent your response.**

Example: All farmers live beyond their means.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
A	B	C	D	E

If you DISAGREE with the statement, fill in the circle below the letter "D".

○ ○ ○ ● ○

Statements

36. U.S. citizens spend more on food than persons in other countries.
37. Pesticides can be used safely in producing food.
38. Not all land is suitable for farming.
39. Organic production methods are a realistic alternative to using pesticides.
40. Biotechnology has increased the yield of crops in developing countries.

41. Confinement is an acceptable practice in raising livestock.
42. Farmers take good care of their animals.
43. Consumers prefer processed foods to raw products.
44. Processing adds value to farm products.
45. Developing countries need help in storing food safely.

46. More people are moving to the cities due to changes in agriculture.
47. A strong agricultural industry is more important than military power.
48. Agriculture employs a large number of people in this country.
49. Farmers earn too much money.
50. Agriculture exports help to reduce the U.S. trade deficit.

51. The U.S. needs a steady supply of food and fiber products to remain strong.
52. The government has too much control over farmers.
53. The world food supply has increased as a result of improved technology.
54. Third world countries lack the ability to produce enough food.

55. Agricultural practices are harmful to the environment.
56. Only organic methods should be used to produce food.
57. Agriculture is the greatest polluter of our water supplies.
58. Raising hybrid plants results in higher yields.
59. Farmers should not use chemicals in crop production.
60. Agriculture has become too mechanized.

61. Farmers are concerned about the humane treatment of animals.
62. Animals have the same rights as people.
63. Animals should not be used for food.
64. Processing food products is a benefit to consumers.
65. Processing adds more to the cost of food than the raw product.

66. Farm grains are becoming an important energy source in the U.S.
67. Farmers should develop new and innovative marketing strategies.
68. The U.S. should allow free trade with other countries for food products.
69. Farmers have no control over food prices.
70. Developing countries need help in distributing food among needy people.

Section III

Directions: Read each statement in this section completly. Select the most accurate response to each statement and mark your answer on the computer answer sheet.

Example: What is your age?

a. 10 - 15 years
b. 16 - 20 years
c. 21 - 30 years
d. 31 - 40 years
e. over 40 years

If you are 17 years of age, you should fill in the circle under the letter "B".

A	B	C	D	E
○	●	○	○	○

71. Gender a. Female b. Male

72. Race a. Asian b. Black c. Hispanic d. White e. other

73. Where is your home located? a. Farm b. Rural area c. Town/city

74. What is the population of the town nearest your home? a. under 2,500
b. 2,501 - 10,000
c. 10,001 - 25,000
d. 25,001 - 100,000
e. over 100,000

75. If you live on a farm, how many acres are included on the farm?
a. less than one acre b. 1 - 50 acres
c. 50 - 200 acres d. 201 -750 acres
e. over 750 acres

76. Do you have relatives that live or work on a farm? a. YES b. NO

77. Do you have relatives who work in an agricultural business? a. YES b. NO

78.	Have you taken agricultural courses in high school?	a. YES b. NO
79.	Have you been a member of the FFA?	a. YES b. NO
80.	Have you been a member of 4-H?	a. YES b. NO
81.	Have you been involved in raising animals or pets?	a. YES b. NO
82.	Have you been involved in raising plants, gardens, or crops?	a. YES b. NO

Which of the following news sources do you use regularly?

83.	News magazines	a. YES b. NO
84.	Newspapers	a. YES b. NO
85.	Radio	a. YES b. NO
86.	Television	a. YES b. NO
87.	Other (please specify _____)	a. YES b. NO

88. What is the highest grade level you have completed?

a. 6th, 7th or 8th grade

b. 9th or 10th grade

c. 11th or 12th grade

d. some college

e. Bachelors degree or higher

Please be sure your have recorded the month and year of your birth date on side two of the answer sheet. Please return both forms when you are finished.

THANK YOU!